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MECHANIX ILLUSTRATED

THE HOW-TO-DO MAGAZINE

AST CHANCE TO ENTER $75,000 CONTEST!

x Pontiac Cars, Hundreds of Other Prizes!

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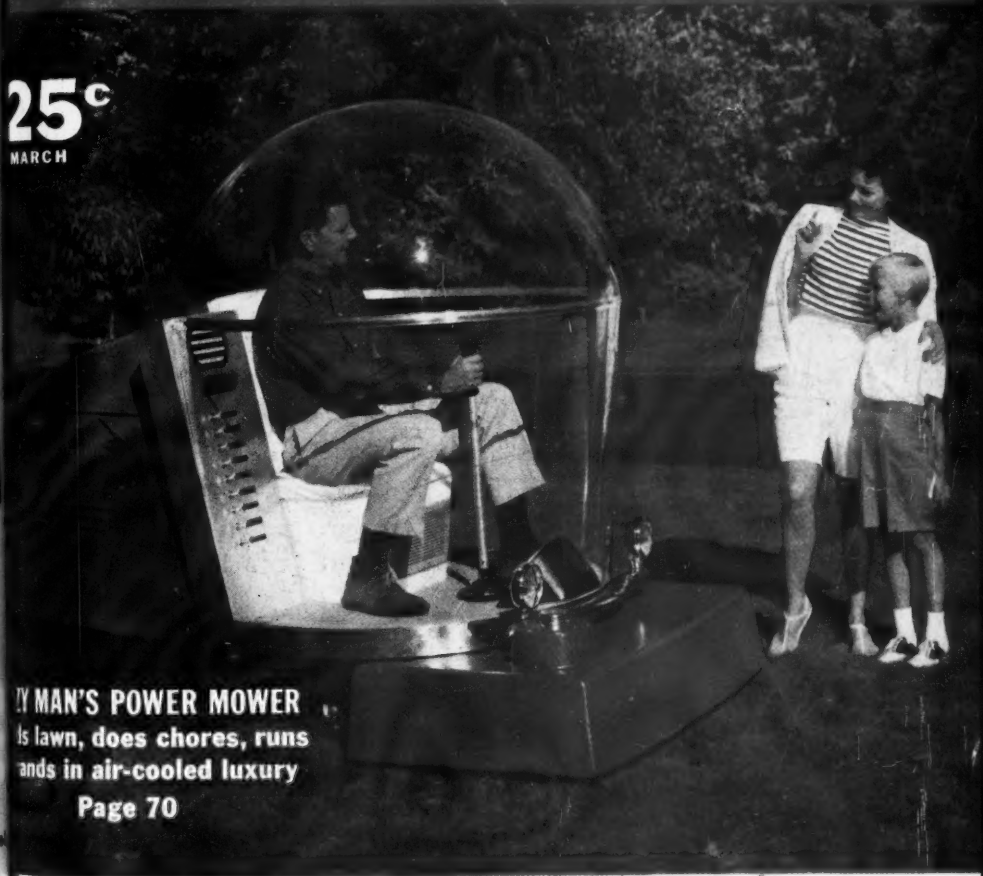

Y MAN'S POWER MOWER
ls lawn, does chores, runs
ands in air-cooled luxury
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CLUSIVE! HOW TO SCORE HIGH ON NEW JOB TESTS

BUILD MODEL STEAM CAR—BE A PARLOR HOUDINI

WIN

the boat and motor of your dreams in Evinrude's

dreamboat contes

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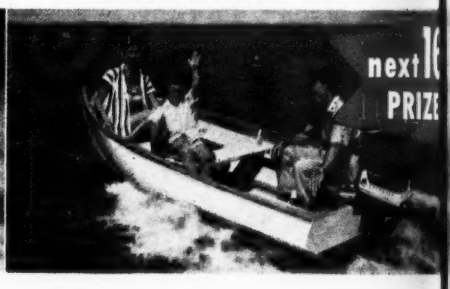

choose from the boats and motors on display at your

EVINRUDE DEALER'S BOAT SHOW

One look at the new Evinrudes—and the latest boats now on display at your Evinrude dealer's—and you'll know you're in "dreamboat" land.

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Whether you win or not, a sightseeing visit to your Evinrude dealer's will be reward enough. Take the family. They'll share the fun—and they can help you win!

A Division of Outboard Marine Corporation
In Canada: Mfd. by Evinrude Motors, Peterborough

FIRST PRIZE — Family Cruiser Outfit. Evinrude 50 hp Starflite V-4 motor plus $3,000 in credit at your dealer for the dreamboat of your choice and accessories up to that amount.

SECOND PRIZE — Family Runabout Outfit. Evinrude 35 hp Lark motor plus $1,200 in credit at your dealer for the family runabout of your choice and accessories up to that amount.

NEXT 16 PRIZES — 4 each Week. Evinrude 7½ hp Fleetwin motor plus $400 in credit at your dealer for the boat of your choice and accessories up to that amount.

GO TO YOUR EVINRUDE DEALER TODAY!
Here's all you do to enter!

1. Go to your Evinrude dealer (look for his name under "Outboard Motors" in the yellow pages).
2. Pick up official rules and entry blank.
3. Look at the boating outfits he has on display. Pick the one you'd like to win, and...
4. Say in 50 words or less why you'd like to win it.
5. Mail official entry blank to "Evinrude Contest."

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quiet outboard motors

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M.E.F. took a proved road to success—and his letter is typical of the thousands we have in our files from men and women in all walks of life.

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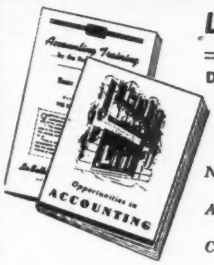

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Name..... Age.....

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City, Zone, State.....

"I call it a bad day if I don't make $25 before noon"

(This chair alone brought $4.50 with twenty-five minutes work and 32¢ in cleaning materials.)

by Harold Holmes

"Just a few months ago I made the big move. I gave up my job and started spending all my time in the little business I had been running on the side. It wasn't an easy decision, but, now I'm tickled to death I made it. Not just because I'm my own boss or because I have an excellent chance of making over $10,000 this year. It goes deeper than that.

"You see, this idea has caught on like wildfire in my town. Not a day goes by without my phone ringing with women calling for appointments. The beauty of it is that once a woman becomes my customer, she calls back year after year. Not only that, she tells her friends, too, and they call me. Before I know it I'm swamped with work. (And at $7.50 an hour net profit it doesn't take long before my bank account is really mushrooming.)

"Funny thing, but back last year, before I started, I never realized the money there was in this business waiting for someone to come along and collect it. Just think: every house in town has furniture and most have rugs or carpeting. I concentrate on just the better homes and have more work than I can handle. You know why? Because women are fussy about their furnishings. Can't stand to see them dirty. That's why they call me over every year.

"The average job is worth $25.00 to me and takes a little over 2 hours. Out of this, after paying for materials, advertising and other expenses I net about $15.00 clear profit. This means I need just 3 jobs a day to clear $11,250.00 in a year. Frankly, since this will be my first full-time year I'll be glad to hit the $10,000 mark. But after that this business should grow larger each year until I have to hire men to help me handle the business.

Personally Trained by Another Dealer

"Believe me there's nothing magic about it. I didn't know a thing about cleaning and mothproofing before I became a Duraclean dealer. But after my application was accepted I was trained right here in town by a successful dealer from another city. I was astonished by the short time it took me to become an expert. Actually, much of the credit must go to the Duraclean process, which is so safe it has earned the Parents' Magazine Seal.

"The portable machine you see is just one of the electrical machines I use. It manufactures a light aerated foam with a peculiar action chemists call 'peptizing'. It means that instead of being scrubbed deep into the fabric, dirt is gently ABSORBED by the foam, leaving the fabric clean all the way down. Women can't believe their eyes when they see how it works. Colors appear bright again, and rug pile unmats and rises like new. I don't have to soak rugs or upholstery to get them clean, which ends the problem of shrinkage, and means the furnishings can be used again the very same day. This alone has brought me a lot of customers.

"As a Duraclean dealer I make money with four other services, too: ***Duraproof*** . . which makes furnishings immune to moth and carpet beetle damage (it's backed by a six year warranty). ***Durashield,*** a brand new dirt-delaying treatment. It coats fabrics with an invisible film that keeps dirt out. ***Duraguard,*** another new service, flameproofs draperies, upholstery and carpets to reduce charring and the tendency of fires to flame up. And ***Spotrout,*** which consists of special chemical products for removing stubborn spots and stains. On jobs where I perform all five services, I multiply profits!

"One of the nicest things about being a Duraclean dealer is that I get continuous help from Duraclean Headquarters. My services are nationally-advertised in famous magazines like McCall's, House Beautiful and many others. I also get a complete advertising kit prepared by experts. (There's even a musical commercial!) I get a monthly magazine full of methods to build business and I can meet with other dealers at Duraclean conventions. I'm also backed by insurance. In fact there are over 5 regular services I get under their unique System.

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"Maybe you too would like to break away from your job and make a fresh start in a business of your own. Do you need a shop? Certainly not. I operate from home. Need a lot of money to start? Not at all. Duraclean finances reliable men, after a moderate down payment, and furnishes enough supplies to return your TOTAL investment.

"You get everything you need: equipment, supplies, advertising matter, personal training, and regular help from Headquarters. To get all the details, fill out the coupon. There's no obligation and you can *decide for yourself*. I'll say one thing: if you DO become a Duraclean dealer, you'll be glad the rest of your life that you took time today to write."

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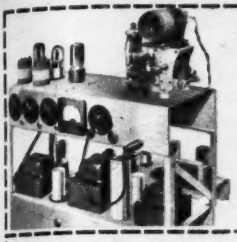

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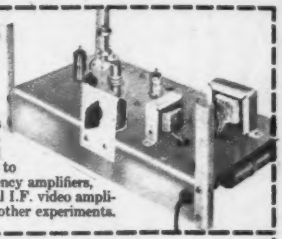

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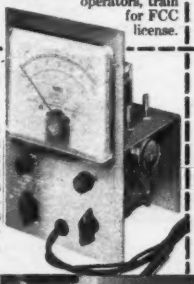

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by Practicing at Home

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Chief Engineer

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"We have an appliance store with our Radio and TV servicing, and use TV repairs. During my Army service, NRI training helped get me a top rated job." W. M. WEIDNER, Fairfax, South Dakota.

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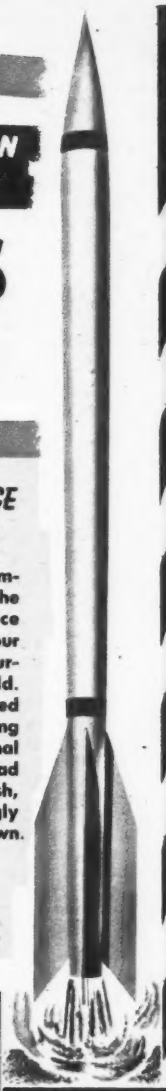

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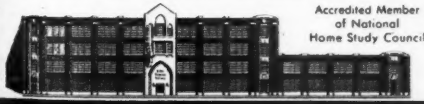

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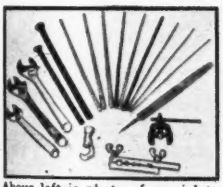

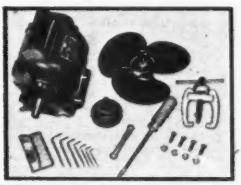

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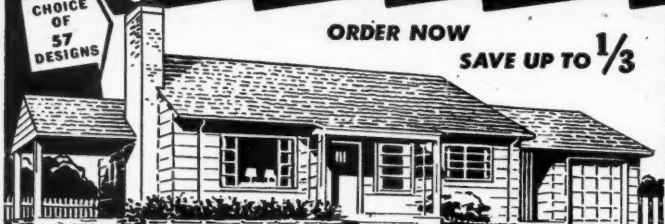

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Invention Clinic

Joseph H. Kraus

In this column each month Mr. Kraus will answer as many letters as space permits on those subjects he feels to be of widest general interest. Time does not allow him to reply to any letters except those printed here. Address your questions to the Invention Clinic, *Mechanix Illustrated*, 67 West 44 St., New York 36, N. Y.

Wire Splicer

Joseph Milla of Flushing, Long Island, N. Y., sends patent drawings for a wire splicing machine. Following a report from his patent attorney, he writes: "Frankly, I do not think much of this idea, even less of spending $300 to get it through Washington." Does it really have any value?

It will twist wires. That is all. It will not make an acceptable splice. In fact, some of the twisting is done where it is not wanted. Any electrician worth his salt will make a better splice by hand than you can make with this machine, and he will not be encumbered by having to use it in small spaces where he sometimes has to work. In our opinion, you have saved yourself a headache and some money.

Weed Puller

Floyd L. Simpson of Denver, Colo., sends a photograph and description of his patent-applied-for invention in which a claw is moved against a blade also serving as a cutter. Manipulated from a standing position, the tool lifts cut weeds. He feels that this is a better method than that suggested in MI (Nov. '57) Inventor's Tip of the Month.

No doubt this tool will be useful for removing occasional weeds of the single root variety, such as dandelion, wild carrot, etc. But it is completely useless on most weeds. In fact, it might even multiply some of them. You will have quite a task with wild onion, oxalis, clover and crab grass. Furthermore, the use of this tool is a time-consuming operation. What is needed is an effective, quick and entirely safe method.

INVENTOR'S TIP OF THE MONTH

Develop a simple technique to put an effective dust-free piano finish on wood, particularly for use by do-it-yourself fans, and you are in business. A transparent, non-yellowing plastic that could be poured on the surface would meet with instant favor. It should prevent staining by hot liquids or alcoholic beverages.

Anti-Slip Crutch

Vernon A. Putz of Pilger, Neb., sends detailed drawings for a retractable device to prevent slipping of crutches on slick surfaces. His attorney informed him that it is doubtful he could get a patent. Should he put this into the hands of a competent invention promoter?

We would hate to measure the competency of a promoter on his ability to put across this idea. As a disabled veteran you should know that you swing your crutch through a rather wide arc for each movement. Yet at only one instant is your anti-slip arrangement effective. If you modify the construction to make the anti-slip unit effective through the complete swing, you automatically eliminate the need for the cushion foot. Don't forget that the danger of slipping is greatest at the beginning of the movement. We doubt that you have supplied a satisfactory solution.

Golf Tee

James E. Pierce of Fulton, N. Y., is patenting a "use and discard" golf tee which will

[*Continued on page* 20]

INVENTORS

If you believe that you have an invention, you should find out how to protect it. The first step is to have a search made of the prior pertinent U. S. patents. If a report on this search indicates that the invention appears patentable you can apply for a patent, and the specifications and claims should be prepared.

The firm of McMorrow, Berman & Davidson, with offices in Washington, D. C., is qualified to take the necessary steps for you. We can make a preliminary search on your invention, advise you whether we think it can be patented, and prepare your application for patent.

Unless you are fully familiar with the U. S. Patent Laws, we recommend that you engage the services of a Registered Patent Attorney to protect your interests. The patent laws are *your* laws. A patent gives you the right to prevent others from making, using or selling the invention claimed in your patent for a period of 17 years.

Use these patent laws for your protection. Investigate whether your invention can be patented. If you have what you believe to be an invention, we suggest that you have this firm make a search for you.

Send for a copy of our Patent Booklet entitled "How To Protect Your Invention," containing information about patent protection and patent procedure. Along with this we will also send you an "Invention Record" form, for your use in writing down and sketching details of your invention. We will mail them promptly. No obligation. They are yours for the asking.

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Invention Clinic

[*Continued from page* 16]

furnish a high ball or low ball setting. He writes: "I know you don't pull any punches in your appraisal of an invention. This is just the type of straightforward, unbiased opinion which I would welcome." Should he deal with companies directly, or approach the premium advertising departments of soft drink and tobacco manufacturers?

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You really haven't proposed anything new. Years ago most autos had fuel reserve systems

[*Continued on page* 22]

INVENTORS

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It is a wonderful proposition for **everybody.** I am satisfied with a **small profit** because I can count on **big volume** to give me a steady **wholesale** business.

Home workers make a big profit because the finished cases they make at home sell for up to 10 TIMES what the raw materials cost! Salesmen in turn, make a handsome profit on every order and make it easy to develop a steady, year-round business that can easily bring in several hundred dollars a month.

Send Me Your Name

If a home business of your own appeals to you, just send me your name on the coupon—without any money—and I will show you how to get started as a member of the Casecraft organization in your locality. I will furnish all necessary material and complete instructions so you can quickly learn to make "made-to-order" luggage. Before you know it, you will understand the basic fundamentals of this fascinating business and be in a position to turn your spare time into cash to the tune of $5 to $10 an hour profit.

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You have your choice of taking orders for yourself or my National Sales Organization can take orders for you. Either way, or both, can be really profitable.

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Let me send you full particulars so you can see for yourself, **judge** for yourself and **decide** for yourself. Know exactly where you stand before you go ahead. Read the material I send you. Talk the matter over with your wife and your friends and your banker. There is no expense involved in getting the facts. So mail the coupon now and you will hear from me by return mail.

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Invention Clinic

[*Continued from page* 20]

and utilized the gravity feed. The Volkswagen still has a reserve fuel reservoir. So your modern dress is merely the signal. There are two potentials for marketing, either the manufacturer of autos or the supplier of accessories. Chances are good you cannot interest the former. We doubt that there are enough people who would be willing to invest in the price of the accessory, plus installation charges, as insurance against their own forgetfulness. Not mentioned is the additional fire hazards.

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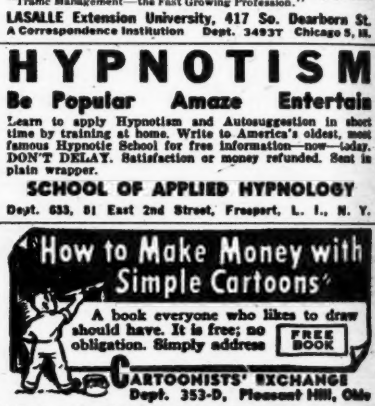

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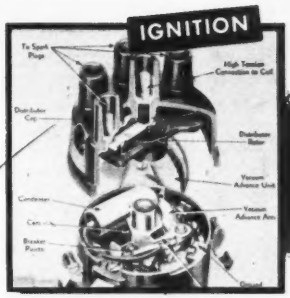

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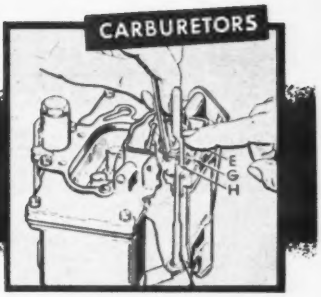

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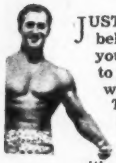

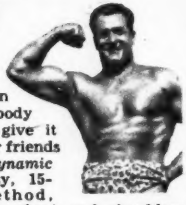

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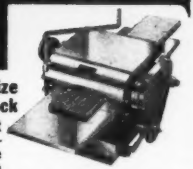

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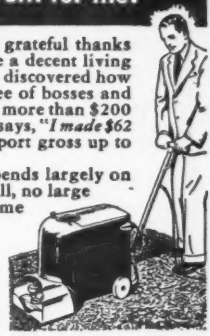

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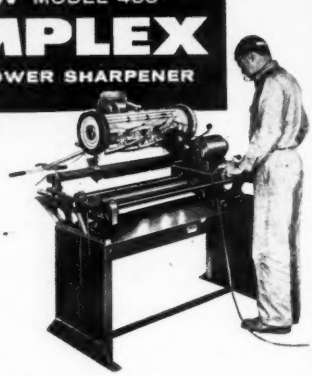

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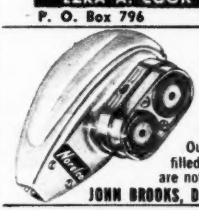

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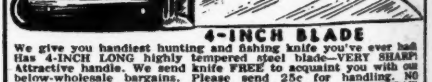

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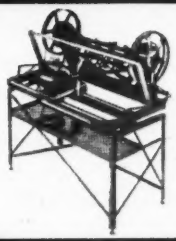

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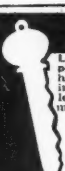

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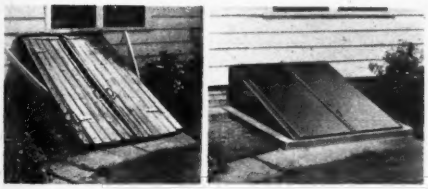

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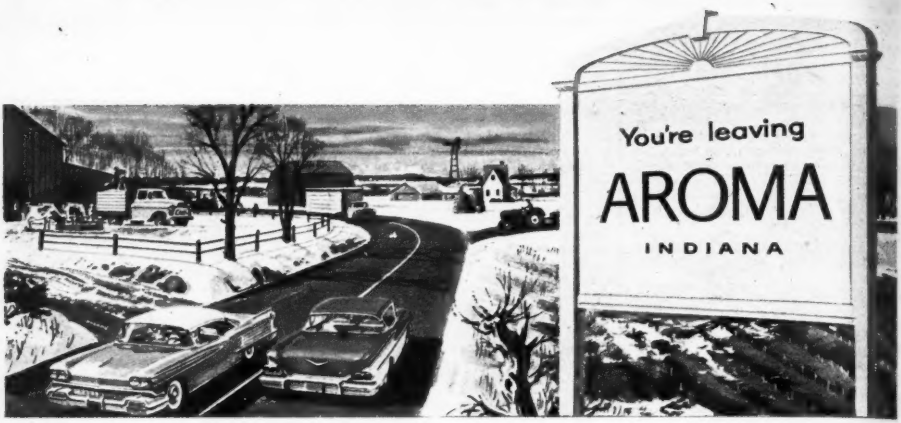
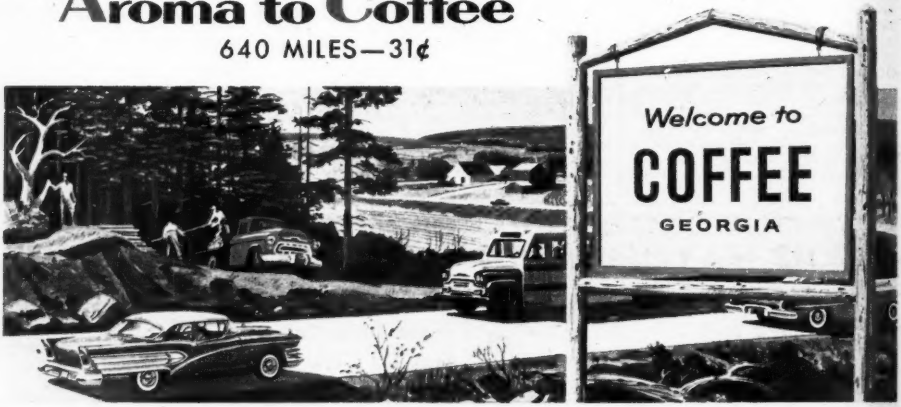


FROM **Aroma to Coffee**

640 MILES—31¢



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It's a fact . . . in the next 12 months, if you're an average driver, you'll travel over 15 times the distance from Aroma to Coffee for a total of 10,000 miles! The engine of your car will have to endure all driving extremes from hot to cold . . crawling to cruising to climbing. All of these conditions can affect its performance and efficiency.

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The next time you change the oil in your engine — change to a new AC Oil Filter, too! Your nearby AC Dealer will tell you how little it costs, how much it does for your engine.

Watch Walt Disney Studios' ZORRO every week on ABC-TV

AC THE ELECTRONICS DIVISION OF GENERAL MOTORS

Mail for McCahill

Uncle Tom is sorry he can't answer all his mail personally. In this column he'll answer the most interesting letters. Write to him at MECHANIX ILLUSTRATED, 67 West 44th St., New York 36, N.Y.

● *I would like to know what you think about this new change in automobile manufacturing—safety instead of horsepower. Why can't the automobile industry have both? I am a teenager and this bothers me because I want speed and safety. Don't you agree with me?*

Pat (Jamie) Paulson
Monroe, La.

It so happens that nearly all of our cars made today are quite a lot safer than they were a few years ago and much faster than ever before. Right now, all the manufacturers are on a full-bore hypocritical safety kick.

● *I just read your review of the Goggomobil and would like to say that you did justice to the car. There is one slight error in your report. I, with the help of a long steep hill and my pilot's license, managed to get the little bug up to 75 mph. Since then I have decided to do all of my flying in the air. I have the standard model (worn mop) and at times managed to get four medium-sized (5'9"; 165 lb.) sardines in it for a short ride. I bought my bug new in Munich, Germany, and have crossed the Alps, Dolomite Alps and Apennines in it. Also the Catskills.*

Irving A. Sherman
Bronx, N. Y.

Look, Irving, we don't question the Alps or Apennines—but the Catskills! That seems unbelievable. In fact, it is the considered opinion of this department that the best way to cross a mountain with a Goggomobil is via Air Freight.

● *I notice everyone's shouting about the small car boom. Do you think it'll catch on?*

Fred Mullin
Rochester, N. Y.

Who's shouting? In the first place (to toss a little oil on the fire) we no longer build any big cars and haven't in years. Did you know that the famed Stutz Bearcat roadster weighed 4500 pounds? Cars such as the old 66 Pierce Arrow, Locomobile, Simplex, Cunningham, Minerva, Isotta-Fraschini, Rolls and many others would make our biggest Fleetwood Cadillacs, Imperials or Lincolns of today look like Dodgems. Today's cars aren't big; there are just too many people stupid enough to build small, cheap garages and now feeling the squeak. The average jockey might feel like a giant in a pigmy camp. That's what the automotive situation is today. I personally prefer small cars for the fun of driving but the average American when he hits the road with his family must have enough car to carry all their needs and belongings for a long vacation, including golf clubs, water skis, Aqua-Lungs, folding boats and dress-up clothes for the gals. You just can't swing that kind of traveling in a Goggomobil.

● *Do you think the free piston engine is a coming thing?*

Bob Hinkson
Chicago, Ill.

Not as long as they can still sell them.

● *What is your method for rotating tires?*

Joe B. Farnum
Flushing, L. I., N. Y.

Start the engine, release the brake, put the car in gear and with any luck, the tires will rotate. Seriously, if you go in for rotating tires (which I don't because of an old ailment—laziness) the best way to do it is not criss-cross, but by shifting the front ones to the rear and vice-versa.

● *Is it true that they used your head as a model for the earth satellite?*

Bud Kelly
Omaha, Neb.

It's not only true but I'm suing them for infringement of my patents.

● *I've had the urge all my life to break the*

[Continued on next page]

glass with the little hammer and then pull the fire alarm.

S. J. Black
Albany, N. Y.

Well?

● *I "dig" you because you like the "car"—and anyone in my book who likes the "car" is right by me. Started driving down South at the age of ten when the state did not require a driver's license. Kids today in my state just don't get the old-fashioned fun out of the "car" I got when I was a boy. Do you agree?*

John S. Williams
New York, N. Y.

John, I couldn't agree with you more—but that's the price of progress. When I was a kid you could buy a new Ford roadster or touring car for roughly $500 and a good top-flight used one for $100. In the departed-but-not-forgotten John Held days, the big adventure was a coast-to-coast trip that included patching tires, sometimes stealing parts and fuel and other upstanding practices. It's unfortunate but everything that was originally fun has, through necessity, been watered-down in the interests of "society." In my father's day, for example, you could shoot ducks 12 months in the year. Early flying laws made a pilot of any kid who could fly a kite and if some guy insulted you, you could belt his teeth out without going to the pokey on a dozen different charges. Some guy said, "We must progress." I'm glad it wasn't me.

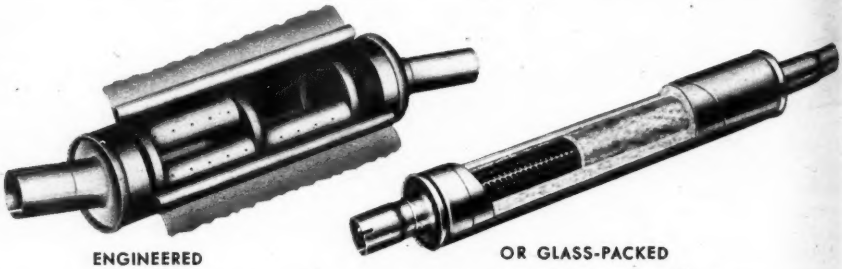
● *I have problem with the inside of my car windows and rear glass frosting and freezing. This, of course, limits my side and rear view, except for an outside mirror. Although I have had several suggestions from service stations and garages, my problem remains unsolved. Can you offer a practical solution?*

Walter Murphy
Detroit, Mich.

Florida.

● *I'm planning on buying a foreign-built sports roadster. From the entire line, I've boiled it down to three: Austin-Healey, MGA or Triumph. The conditions are: I want it used but no more than 25,000 miles on it. My average speed on the open highway is about 80 mph. I want a machine I won't have to worry about or tinker with three days out of the week. I want a fair resale value and*

[*Continued on page* 50]



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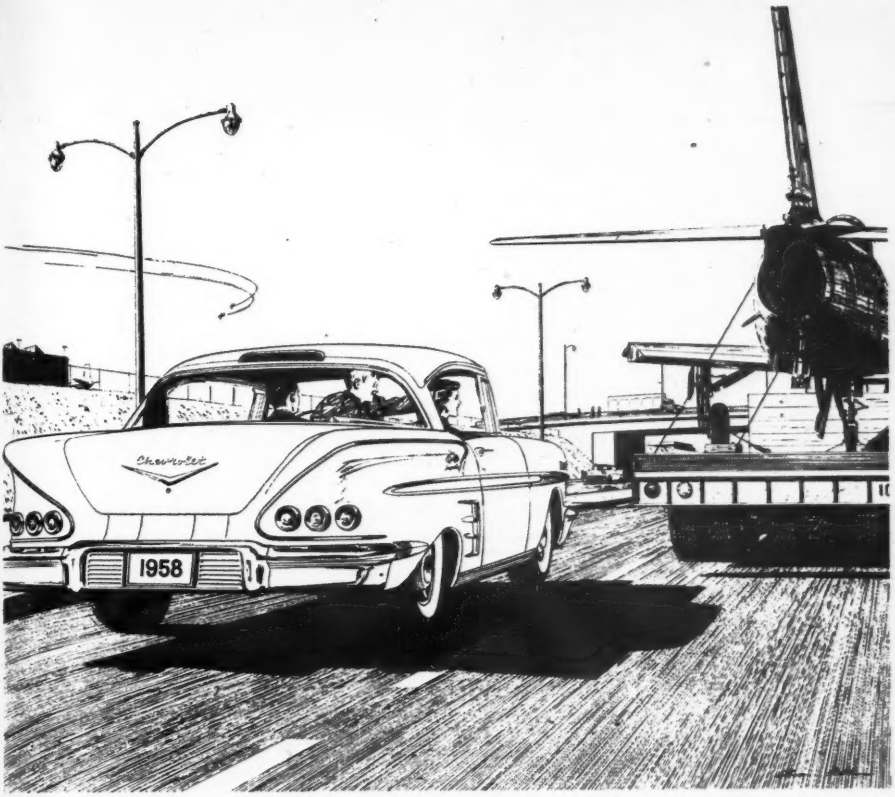

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Like peaches and cream, some things seem just made to go together. On the road, the combination that really fits like a glove is Chevy's Turboglide* transmission and the radical new Turbo-Thrust V8*.

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The actual elation this superb combination provides is impossible to describe. When you experience it yourself, you'll know one of the great moments of motoring. Why don't you let your Chevrolet dealer set up that great moment for you—this week?... *Chevrolet Division of General Motors, Detroit 2, Michigan.* **Optional at extra cost.*

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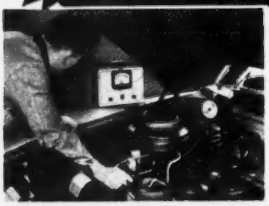

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Mail For McCahill

[Continued from page 48]

minimum depreciation. And, of course, I want economy and a reasonable price. Which of these three would you suggest for my use?

Johnny G. Luna
White Sands Proving Ground, N. M.

None of them. Your requirements are too high.

● *The weatherman at Patrick Air Base at Cocoa told me why the beach was so rough at Daytona during the '57 Speed Trials. A cold mass of air from the North met a bunch of hot air from McCahill and caused an offshore low pressure area and high tides.*

K. R. Millar
Orlando, Fla.

You may be right about the hot air but as I didn't go swimming during Speed Weeks, the high tide pitch is erroneous.

● *My husband tells me an emergency brake is not able to bring a car to a complete stop while going 50 mph. Why bother putting them in cars?*

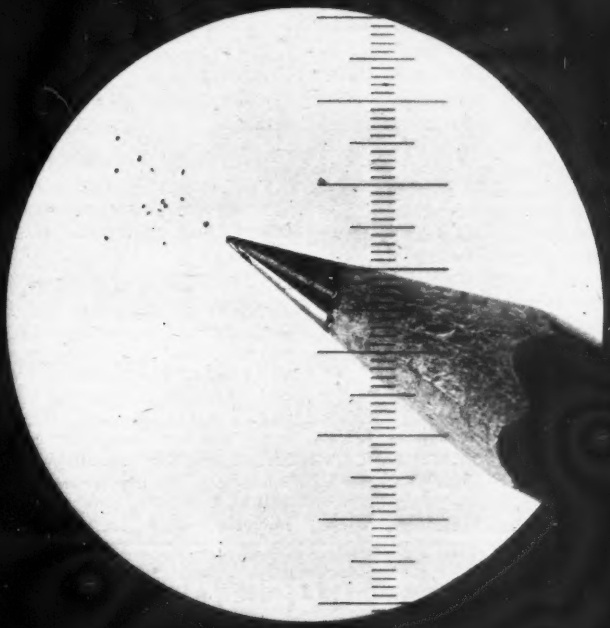
Mrs. C. F. Montanye
Waddington, N. Y.

For parking purposes.

● *I sincerely enjoyed McCahill Sounds Off in the September issue. May McCahill's pen acquire more power. I hope our traffic enforcement officials and the safety councils will one day realize more than 75 per cent of the auto deaths are in accidents in which speed is not a factor. As a newspaper editor I have for several years consistently maintained in print that our highway patrols and motor squads are speeder happy. They spend their time attempting to catch a driver traveling three to five miles per hour over the posted speed limit. They could halve our death toll if they would spend their time arresting drivers whose violations are the cause of the accidents: the ones who go through traffic lights and stop signs, turn from the wrong lane, pass on hills and curves and drive automobiles with defective equipment. Few drivers know what to do in a skid. Our enforcement agencies could start a program of education. It is these motorists, not the person traveling 63 mph in a 60 mph zone, who are the killers. On the Florida Turnpike vehicles travel at 65 and 70 mph. There has been one fatal accident. A man decided he was hungry and wanted to return to a restaurant he had passed. He turned across the center median, paying no attention to many signs forbidding crossing of the strip. He care-*

[Continued on page 52]

specks the size of a micron



can shorten your engine life

Waste and abrasive particles *far too small to see* with the naked eye can have a deadly effect on engine performance. That's the problem that led to the development of the MoPar Micronic Oil Filter. It eliminates even these particles from the oil system, to the size of a *micron* (.000039 of an inch).

This means that the filter catches over ⅓ more dirt per square inch than ordinary filters. Chrysler Corporation Engineers perfected the method by means of a special filter element paper. These "Forward Look" engineers also developed—

- greatly increased filtering speed—because the filter surface area is over 8 times larger than conventional types—571 inches against 69.
- far greater *capacity*—3 to 5 times the capacity of a waste-type filter of corresponding size. And there's no unloading, warping or distorting.

If you demand top engine performance and value your engine life, you'll use a MoPar Micronic Oil Filter. The name MoPar means *genuine* Chrysler Corporation parts and accessories, made to highest precision standards. Available at all Plymouth, Dodge, De Soto, Chrysler or Imperial dealers, or leading independent repair shops.

GENUINE CHRYSLER-ENGINEERED

MoPar
PARTS & ACCESSORIES

MoPar Division, Chrysler Motors Corporation
Detroit 31, Michigan

[Continued from page 50]

lessly turned into the other lane directly in front of a truck. Two were killed. Both truck and car were traveling about 30 mph. Drivers like this one are the killers.

J. C. Gerard
Hollywood, Fla.

Thanks. I couldn't agree with you more.

● *For many years I've been an admirer of you and* MECHANIX ILLUSTRATED. *I have made it a point to save each copy of MI and thus have a rather complete collection. In going back through volume after volume I'm unable to find your report of the Jaguar Mark VII. What happened to that report? Am now wondering if you ever made a report on my most-favored auto. If you did, is there a possibility I could buy a back-dated MI with that report?*

G. W. George
Soda Springs, Idaho

You haven't been reading MI long enough, G. W. I won the Daytona Beach Speed Trials in '52 with my own Mark VII and this was written up in complete, gory detail in the May '52 MI. Back issues, if available, can be obtained from Fawcett Publications, Greenwich, Conn. However, not all are available and my own file has many vacant spots in it.

● *I have a wagon at home which my dad and I recently made, which I use for hauling wood. The back wheels have wooden spokes, ball bearings and brass hubcaps which screw on. The name on the hubcaps is "Durant." Was there or is there a car named "Durant?"*

George Pitonzak
Portage, Pa.

Sure was. It was made in New Jersey by Will C. Durant, once president of General Motors and one of the automobile greats of all time.

Twelve years ago the first automobile test articles ever printed in America appeared on these pages. In the past 12 years the writer has lost most of his hair, most of his friends and most of his marbles. I've met thousands of interesting characters, have traveled over a million miles and have met a lot of nice guys, too. Twelve years of testing the United States' and Europe's finest have convinced me that you should never underestimate the value of a horse or one of Frank Schwinn's bicycles.—*Tom McCahill*

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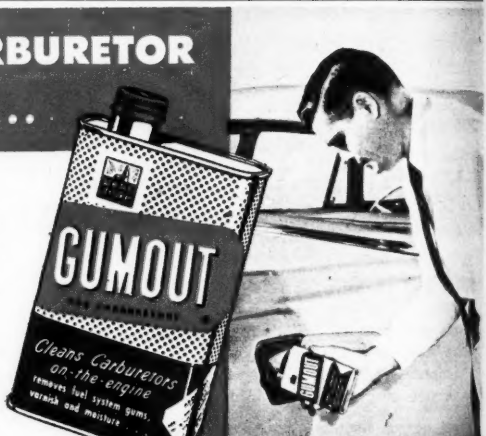

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In just 12 months more than one million people bought new cars of The *Forward* Look. And nearly *half a million* switched to them from other makes of car. Their reasons? They're finding more that's new . . . more that's right . . . than they find anywhere else.

1 **Take, for example, the rightness of style—the dart-shape of motion.** No other design contributes so much to performance. Even cuts steering corrections in cross-winds as much as 20%!

2 **There's the wonderful difference of Torsion-Aire Ride.** It's America's one new completely different, completely proved system of suspension. So right it prevents starting squat, braking dip, lean on curves. *Yours at no extra cost* in every Plymouth, Dodge, De Soto, Chrysler, Imperial.

3 **Pushbutton TorqueFlite — A "first" and so right** — found only in cars of The *Forward* Look. Reliable, mechanically-linked control buttons, placed safely at the driver's left. Plus *full control* of automatic transmission with *two* extra selector buttons for such conditions as mud or snow, for downhill engine braking, for flexibility in traffic and up steep hills.

4 **New Constant-Control Power Steering makes a wonderful difference, too.** It works the right way—full time, not part time. Pioneered by Chrysler Corporation, it takes the work out of steering, yet gives you full control, wonderful new "feel" of the road.

5 **Your toe works less, the brakes do more, with Total-Contact braking.** The difference here is big and right: quicker straight-line stops with up to 25% less pedal pressure; longer lining life, and only cars of The *Forward* Look have two cylinders working each front brake.

6 **You see up to 50% better** with Control Tower windshields that sweep back into the roofline to let you look *up* as well as out. With safety glass all around, of course. The "all outdoors" feeling comes true again in the roominess we give you inside. More, model for model, than any other makes of car!

But the rightness goes further! In every great engineering achievement, in every fine detail of styling, in the total design and total *value* of these cars. It's simply a matter of giving you more for what you pay. But don't just look at a great '58 of The *Forward* Look—drive around, and discover the rightness for yourself!

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AUTO MECHANICS

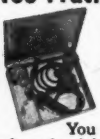
EARN GOOD PAY ENJOY SECURITY

A Trade You Can Learn at Home

Now hear this: if you want to step into a good, top-pay job—or open a shop of your own! The auto industry is America's greatest. No wonder! There are over 60 million cars and trucks on the road, and a third are in the "heavy-repair" classification. Each year, over 7 million new vehicles are produced. As a result, there's a severe shortage of skilled mechanics—and too few are training to fill the vacancies. What an opportunity for you! Yes, you can have one of those high-pay, steady, life-long jobs. How? *By training at home in spare time!*

The CTI Shop-Method Home Training Plan gets you ready for success in months—not years. You get easy-to-understand picture lessons, as well as valuable tools and a tune-up kit (see below). You learn to repair engines, transmissions, brakes, and the various systems—cooling, lubricating and electric. And that isn't all: *If you want additional training in Diesel Mechanics or Body-Fender Rebuilding, you get it (without extra cost).* Why not get all the facts? You can, by just filling out and mailing the coupon. We'll send two FREE BOOKS that show how *you* can fit into America's No. 1 industry.

You Practice with Tune-Up Kit and Tools



Only CTI sends this professional Tune-Up Kit. It includes a Compression Tester, a Vacuum Gauge and Fuel Pump Tester, an Ignition Timing Light, and a portable steel case. Instruments locate engine troubles quickly, help you get valuable practice.

You get this top quality set of mechanic's tools. You'll need tools to practice and for experience, and to earn money spare time. Tools increase your interest, stamp you as a "pro." *You get both the Tune-Up Kit and the set of tools as part of your* training—no extra cost.

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"WHY TIRES GET TIRED"

IT WAS 4 A.M. in the parking lot and the tires got talking.

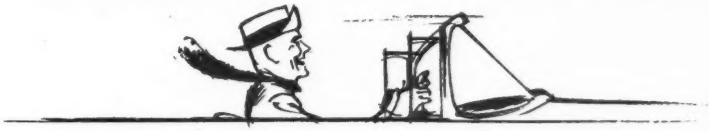
"Boy, it's tough," said the left rear. "Carrying car tonnage at 70 M.P.H. is bad enough without the driver punishing us, too."

"Yeh, sudden starts, stops and fast, sharp turns grind off rubber," said the right rear.

"Banging and scraping against curbs and rocks is bad," added the right front. "And under-inflation shortens our lives."

"Yes," replied the left front. "And the front wheels have excessive toe-in that's scraping us to the cords. When I blow the boss won't like it."

Smart drivers save. They have their tires checked (and rotated) regularly by their Texaco Dealer . . . and they buy their new tires from him — and batteries, too.



Why smart drivers don't get tired! A rough-riding chassis tires you, without your knowing why. It's worse if you get squeaks and rattles. That's the reason Texaco developed cushiony, smooth-riding Marfak chassis lubrication. Makes riding and handling easier and safer. Marfak seals itself in against dirt, dust and splashed water. Protects against wear. See your Texaco Dealer — *the best friend your car has ever had.*

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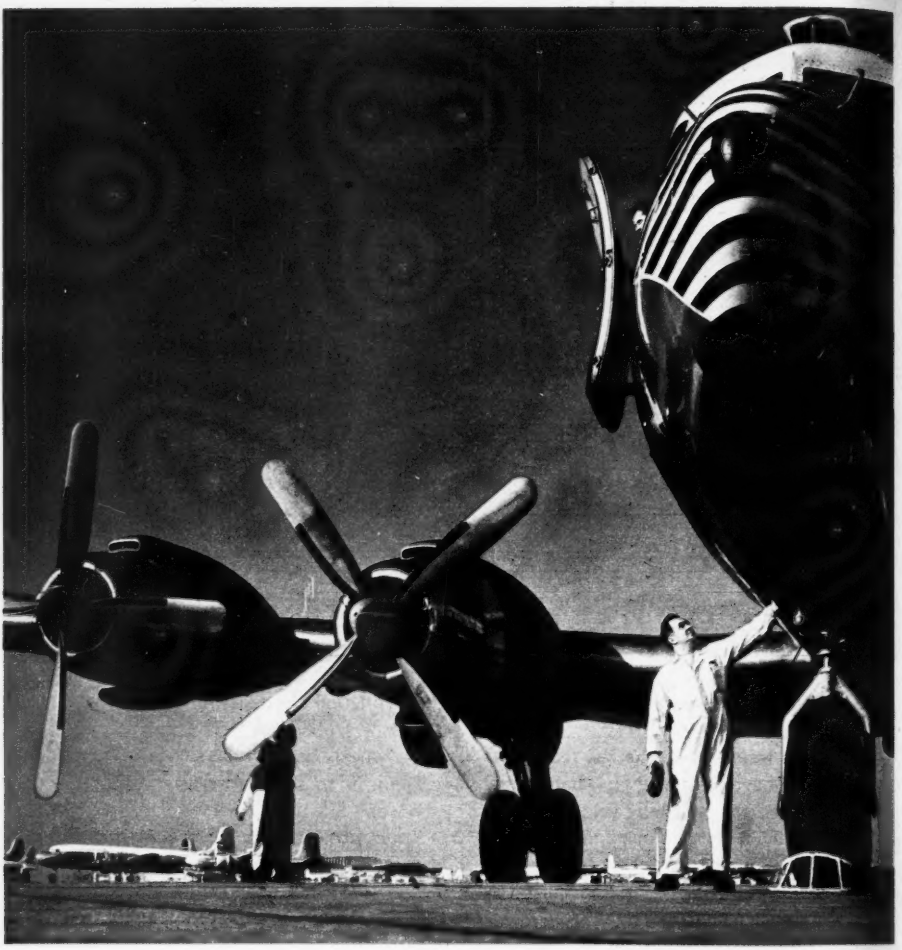
TUNE IN . . . METROPOLITAN OPERA radio broadcasts Saturday afternoons, ABC.



In planes as in passenger cars, Champions deliver full-firing power.
Above: DC-7 gets set for flight from Idlewild to Paris.

Q. Why do all the world's major airlines use Champion spark plugs?

A. Champions give full-firing power
Put new Champions in your car every 10,000 miles. You'll get an *immediate* boost in horsepower...and save gasoline, too!

World's favorite spark plug on land, on sea, and in the air

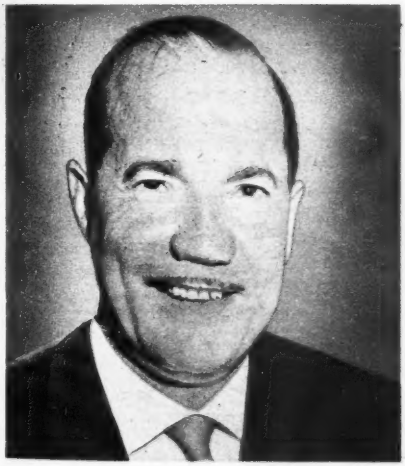
CHAMPION

MECHANIX ILLUSTRATED
MARCH 1958

Here is a dynamic plan to thwart the Red challenge and enable the U. S. to forge ahead in the vital science race.

LET'S CURE THE SCIENTIST SHORTAGE --NOW!

By Victor L. Anfuso,
Member of Congress, 8th Congressional District, N. Y.



CONGRESSMAN ANFUSO, author of the bill that would establish U. S. Science Academy.

A MILITARY man of increasing importance in this age of ICBM's and Sputniks is the soldier-scientist. The manpower shortage in this field is acute and growing steadily worse—and yet the problem is being handled in the conventional business-as-usual manner.

There is currently little encouragement for the young scientist to join the armed services. In fact, any young men who want to be soldier-scientists under present conditions are being unrealistic. They stand a fine chance of being utilized as motor mechanics or telephone operators.

Recently a young draftee known to the academic and scientific worlds as a mathematical genius was discovered in the Army, assigned as a clerk-typist at Ft. Lee, Va. Pvt. Ernest Shult was only one victim of the armed forces' so-called "Classification System," and his case might be considered humorous if it were

not so tragic. Today we cannot afford to waste a single scientist in a position that does not take full advantage of his talent and knowledge.

Repeatedly, we now hear these warnings: "Don't get hysterical. We do not have to copy Russia's totalitarian methods of regimenting science." I agree. But let's not lose sight of the fact that the Russians don't have to worry about placing enough scientists with their armed forces. The Kremlin presses a button and gets all the scientific manpower it needs, where it needs it.

I believe our free system can be just as effective if we establish a United States Science Academy. I have drafted a bill for a law creating the United States Science Academy, and by now the bill should be under active consideration in Congress. Talks I have had with some of my colleagues and various science leaders regarding the Science Academy have been encouraging. As a matter of fact, after contacting the White House I have reason to expect approval of the bill from the President, and bi-partisan support for it in Congress.

If passed unchanged, my bill will contain the following provisions:

1. The establishment of a permanent United States Science Academy under the Department of Defense.

2. The purpose of the Academy will be to train selected citizens, to be known as Cadets, for service as officer-scientists with any of the armed forces.

3. Cadets will be between 17 and 25 years old and will receive a minimum of four years training.

4. Upon graduation, all Cadets will be required to serve a minimum of three years in the armed forces of the United States.

UNCLE SAM also needs women scientists like Joyce Myron, atomic energy expert.

AIR FORCE ACADEMY being built in Colorado has been suggested for science school.

5. Admission to the Academy will be by competitive examinations supervised by the National Science Foundation.

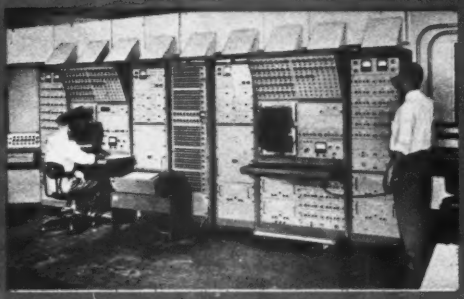
6. Candidates shall also be named by foreign nations who are allies of the U.S., provided such candidates can pass a strict security check.

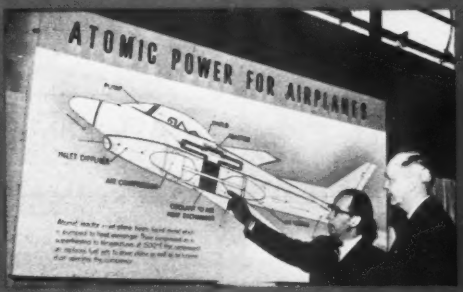
7. Physical standards will be minimized; by de-emphasizing brawn we may get more brain into the armed forces. We should not forget that one of this country's most brilliant scientists, the great Steinmetz, was a badly deformed cripple.

8. The atmosphere at the Science Academy will be studious but not over-militarized. The cadet's standing as a scientist will be the only consideration—not his military knowledge. We already have three service academies.

In all other respects, for purposes of administration, the Science Cadet will receive a completely free education, pay, housing, medical care, and supervision, under the same rules now governing other service academies.

Since this is an entirely new venture, there is no way of estimating now the cost of establishing the Science Academy, which I hope will be equipped with the finest facilities that money can buy. No doubt, it will run into many millions of dollars, to be financed out of the Defense Department's budget. It may mean a tax increase somewhere along the line. But how else can we meet such a challenge as was reported recently from Russia—that the Communists are going to establish an entire "scientific town" with a population of 20,000, ten major research institutes, a large new university, and housing accommodations for the best scientific brains to be gathered from all parts of Russia? [*Continued on page* 168]





SOLDIER-SCIENTISTS are desperately needed by the government in the four categories shown in the photographs above. Top to bottom: electronics, guided missiles, radar, atomic energy.

LABORATORY I

FRANK TINSLEY '57

Y IN OUTER SPACE

By Frank Tinsley

MANNED SATELLITES, to be up by 1965, will be built (left background) and serviced by ferry rockets that can reenter the atmosphere, land.

FOLLOWING the first satellites and the perfection of manned rockets that can reenter the atmosphere and land, the third major step into space will be the space laboratory. In this manned station we shall be able to study conditions in space and to push back the limits of our atmosphere—fog-

ged astronomy. The lab, which should be in orbit by 1965 according to some authorities, will rotate about the earth as it revolves on its central axle-like spindle, creating an artificial gravity field. It will be built in orbit by ferry rocket crews. The third stage of their rockets will be powered by a solid fuel that can be stopped and started at will. Prefab panels will nest in the rocket bodies about the central fuel cores. Pilot and building crews will ride in the nose compartments. After the station is built, rockets will serve as service and supply ferries.

Let's suppose the space lab is up there—and somehow we've wangled a trip in a ferry rocket.

Our approach has been nicely calculated. After veering and braking with nose rockets we hang vertically in the shadow of the satellite, our rocket nose cone just below the trumpet bell of the dock. The station's electromagnets switch on and our ship noses gently into the receiving tube. Up we slip, never touching the dock sides, until our fluted nose locks in its seat with a barely perceptible jar. Slowly, our ship begins to rotate on its longitudinal axis until its spin matches the speed of the hub. Then the hatchways are thrown open and we see the Docking Officer grinning down at us.

The slightest push on the rocket cabin floor sends us floating up through the nose hatch into the satellite. We emerge into the large, well-lighted hub chamber, its expanse of cylindrical wall broken by circular hatches leading to the four "spokes." One of these is open and through it we see into a tiny, self-service elevator poised snugly at the top of its shaft, ready for the supplies the technicians are helping the pilot to unload. The supplies are packed in long, pie-section containers, designed to fit the ferry rocket neatly. They float upward at a touch, are guided by fingertips into the elevator. There, the magnetized floor holds them securely.

As the little lift makes its first trip out to the rim, we seize the opportunity to take a look at the observatory. Unlocking the airtight door, the Docking Officer volunteers to act as our guide. He calls our attention to the hatchway between the spinning hub and the static observation tower. A deep circular coaming revolves inside the tower opening so we can float through without the slightest danger of being pinched between the two. The lower deck of the tower is an astronomical lab, fitted with photo and mapping equipment, electronic calculators, etc. The technician on duty shows us around the tiny cubicle, pointing out photos of incredible clarity.

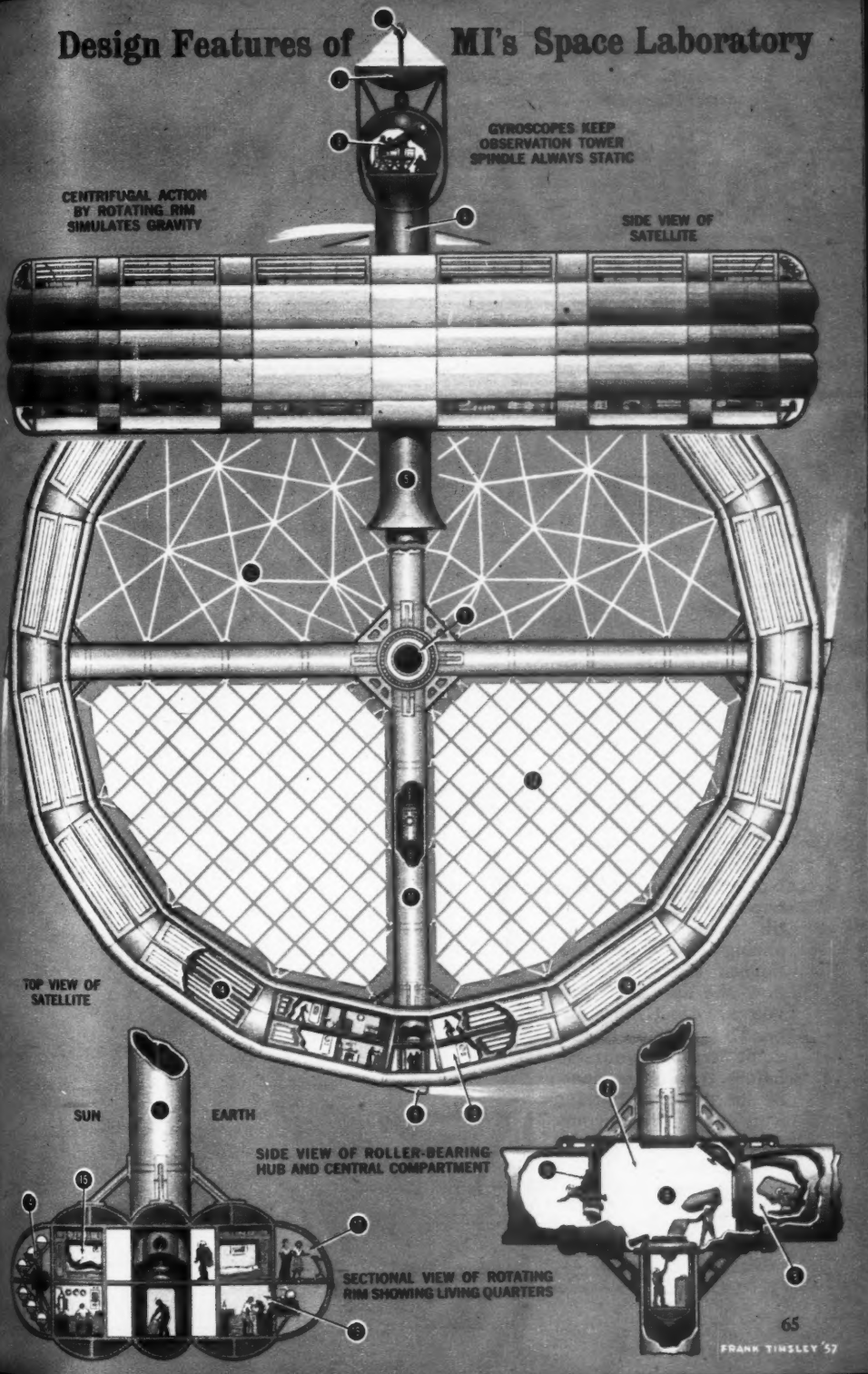
Ascending to the deck above, we find ourselves in a unique observatory. It is enclosed in a ball-like shell, mounted in a socket so it can move in any direction. The telescope, capable of minor adjustment in its fixed cradle, can be locked on a given star and be held there throughout the satellite's orbit by electonically-controlled movements of the shell. In the airless vacuum of space, neither weather nor atmosphere exist to distort the lens. Pictures of the most distant galaxies come through in sharp detail.

Returning to the hub chamber, we board the elevator and move out to the living quarters in the satellite's rim. Doffing our spacesuits, we emerge in an air-conditioned corridor flanked by staterooms. Here we walk about easily in the artificial gravity created by the satellite wheel spinning about its axle. Power is provided by photon rockets drawing their energy from solar batteries which fill the four wedge-shaped spaces between the wheel spokes.

To permit precious privacy, there is a stateroom for each member of the crew. Each is [*Continued on page* 183]

SPACE STATION. 1. Electronic eye keeps station facing sun. 2. Polar mirror generates power, shades telescope. 3. Observatory rotates in socket. 4. Astronomical lab. 5. Tubular dock. 6. Photon power units. 7. Unpressurized hub. 8. Crewmen unloading ferry. 9. Supplies go from ferry to elevator. 10. Hatchway to observatory. 11. Spokes hold elevators, stairs. 12. Cross bracing holds solar battery field. 13. Gravitized living area. 14. Tubes of algae make oxygen. 15. Individual quarters. 16. Labs. 17. Promenade.

Design Features of MI's Space Laboratory



HOW DOES SHE DO IT?

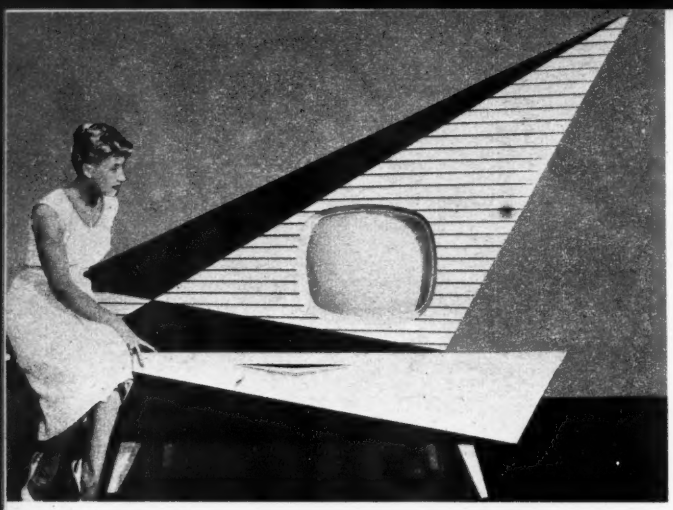
THIS amazing finger feat, a rare display of delicate digital dexterity combined with marvelous muscular coordination, is really not as difficult as it appears to be at first glance. Note the chair and the cup and saucer beside the shapely belle balancing easily on one finger. Do you know how she does it or are you scratching your head? Look closely and don't try it yourself before turning to page 80 for the explanation. You may strain your untrained digit. •

MOTOR TOBOGGAN can do 25 mph on its 1-cylinder, 9-hp Briggs-Stratton engine. It pulls loads up to 1,000 lbs. Canada's Four Wheel Drive Auto Co. Ltd., makes motorized sled.

It's New!

TUBLESS washing machine does four-lb. load in ten minutes and can be used in any large pail, sink, etc. It weighs nine lbs., is 14 in. high. AMI Inc., Grand Rapids, Mich. makes the $59.95 device.

CONTINUED...



FINNY design is latest in German radio-TV-phono-combinations. TV triangle rotates in any direction via remote control. Price in Germany is about $750.

GERMAN JEEP developed from Goliath 1100 auto has four-cylinder, 40-hp engine and a top speed of about 74 mph. Rig totes 9,000-lb. pay load.

ROOFTOP speedometers on police cars in W. Germany remind motorists to stay below 30-mph limit in cities. It's handy for checking your car's speedometer, too.

POP-UP cigarette lighter on this new RCA table radio takes power from line only during ten-second heating operation. Four-tube radio sells for $39.95.

DUNKABLE Army jeep must be manned by men who like water. Pipes sticking up extend from engine's air intake, exhaust. Jeep was driven out after this picture was taken.

ONE-MAN whirlybird weighs only 68 lbs. Prototype's jet engines can run on cheap propane gas, flashlight batteries.

TRICYCLE designed for adults or handicapped weighs only 45 lbs. Cyclo-Pedia, Detroit, Mich., sells $110 three-wheeler.

DISPOSABLE typewriter ribbon on Plexiglas roll, left, is used once, then discarded, right. Easy to change, new German carbon ribbon gives amazing clarity.

COVER STORY

LUXURY MOWER OF TOMORROW

IT'S called the Wonder-Boy X-100. It looks like it came from outer space and while it is only a prototype, it promises to be your yard mechanic of the future.

Designed and built by the Simplicity Manufacturing Co. of Port Washington, Wis., this luxury mower of tomorrow has a 54-in. plastic-bubble cockpit that is air-conditioned and will make it possible to manicure your lawn in any kind of weather.

Wonder-Boy will mow your grass, feed it, weed it, spray for insects, plow snow, haul equipment and provide handy power take-off for garden chores. It can also be used as a golf cart. The unit is designed as a vehicle for short-run highway travel without its mowing attachment.

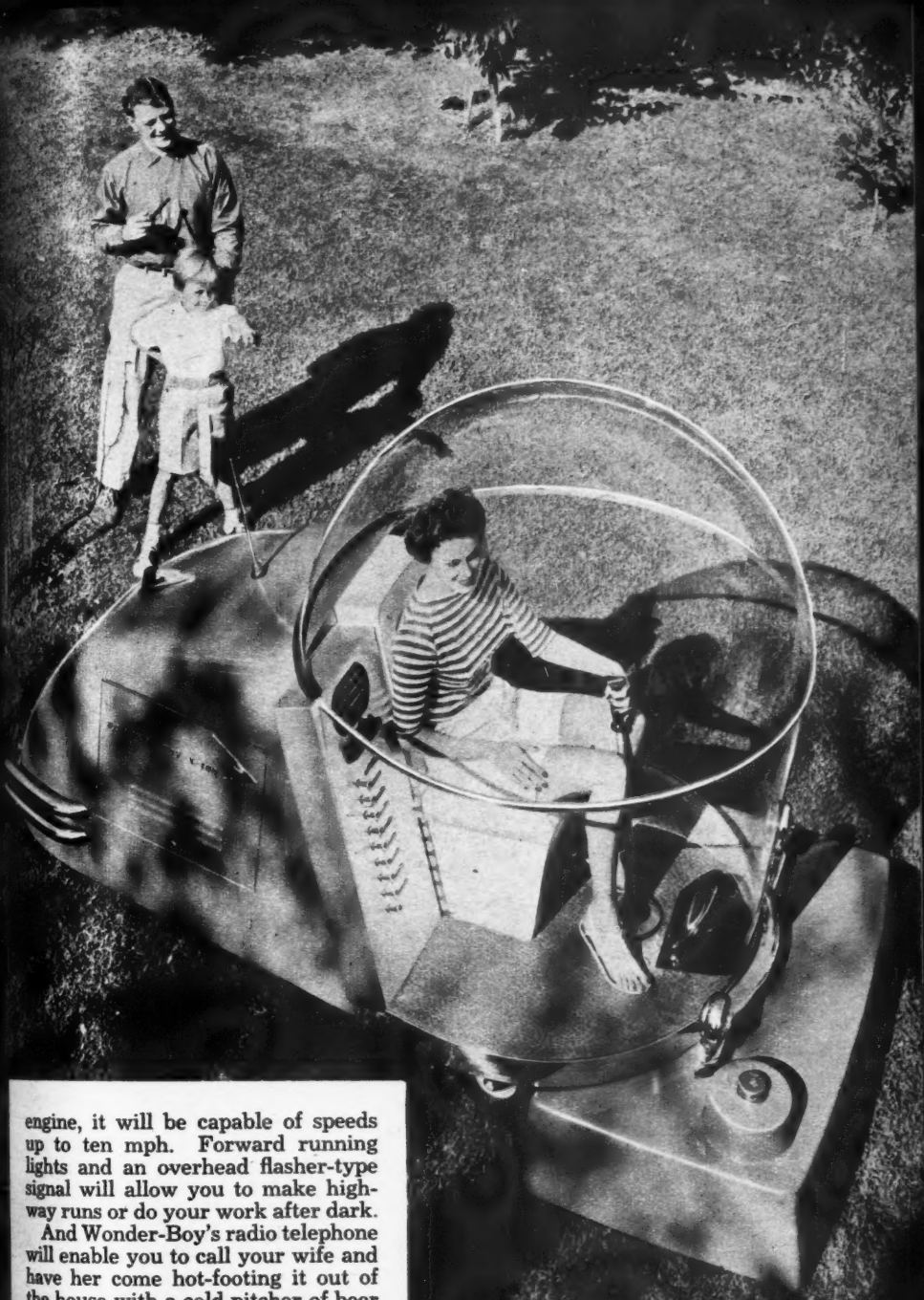
The futuristic model weighs close to 500 lbs. It has an overall length just under nine ft. and stands six ft. high. Powered by a 10-12 hp Briggs-Stratton

EVERYBODY will want to get in the act and Dad will have to fight to mow the lawn.

WONDER-BOY X-100, without mowing attachment, can be used for highway runs.

BUTTONS operate radio-telephone, lights, seeder, host of other chores vehicle does.

JOY STICK steers and brakes mower which is easy to handle, comfortable and safe.



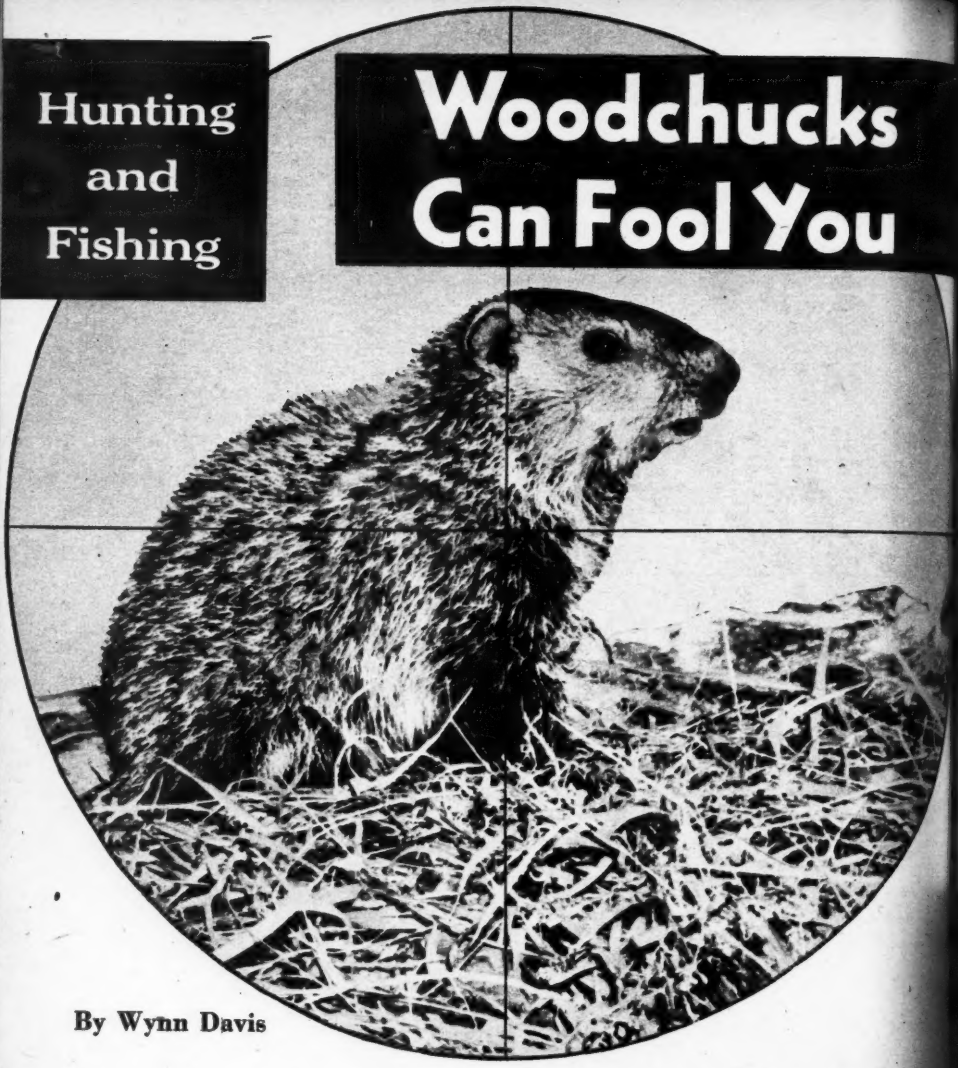
engine, it will be capable of speeds up to ten mph. Forward running lights and an overhead flasher-type signal will allow you to make highway runs or do your work after dark.

And Wonder-Boy's radio telephone will enable you to call your wife and have her come hot-footing it out of the house with a cold pitcher of beer after a tough day of mowing the lawn in your air-conditioned blister.

Ain't science wonderful? •

Hunting and Fishing

Woodchucks Can Fool You



By Wynn Davis

BESIDES being top sport in itself, woodchuck hunting is great practice for deer hunting—and it's available from May through September, from Mexico to Alaska. Woodchucks abound all over the country, giving you plenty of game and yet plenty of sport—for the chuck (called rock chuck and whistling marmot in the West) is a wary beast.

Several times a minute, even while eating, he'll sit up cautiously to scan the countryside in all directions. And believe me, Mr. Chuck has 20-20 vision. When he spots you coming he can disappear so fast you wonder if he

STONE FENCES are natural cover when you're after the sharp-eyed king of the cow pasture.

really was there. Knowing this, the expert chuck hunter moves very slowly and makes no sudden, swift movements of arms, hands or head.

Your first move in hunting chucks is to find a good feeding ground on the property of a farmer who has given you permission to hunt his land. Farmers are more willing for you to hunt chucks than other game because the varmints eat grass, clover and produce and make big holes for cows and horses to break legs in. Look for a field of rich grass with several mounds of fresh earth in it. The mounds will have taller grass around them than the rest of the crop.

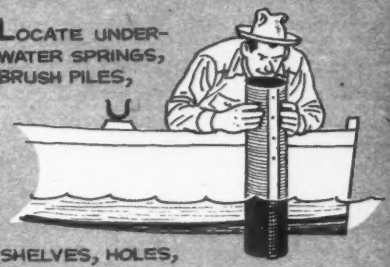
The best way for a beginner to approach chucks is to get to their area before they come out in the morning or afternoon—usually before 10 a.m. or 4 p.m.—take up a well-concealed stand and wait. Another technique is to glass a field carefully, mark all feeding or napping chucks. Then walk right on in and watch the animals as they dive into their holes, thus marking the place they'll show themselves. Conceal yourself in the most strategic position and wait for the targets to reappear when they believe the danger has passed. During this wait, and it may be a long one, you must remain absolutely motion- [*Continued on page* 176]

BURROWS are a waste of time if nobody's home: look for fresh earth at entrance.

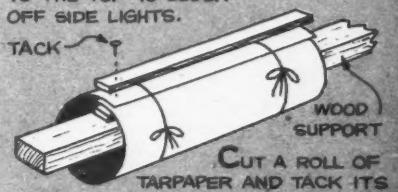
SPORTS TIPS

BY HAL SHARP

SEE UNDERWATER FISH AREA WITH THIS TUBE



SHELVES, HOLES, ET CETERA, WHERE FISH LURK BY VIEWING THE BOTTOM THROUGH THIS TUBE. HOLD TUBE'S END BELOW THE SURFACE, AND BRING YOUR FACE CLOSE TO THE TOP TO BLOCK OFF SIDE LIGHTS.



CUT A ROLL OF TARPAPER AND TACK ITS OVERLAPPING EDGES BETWEEN TWO STRIPS OF WOOD. STRING HOLDS ROLL UNTIL TACKING IS DONE.

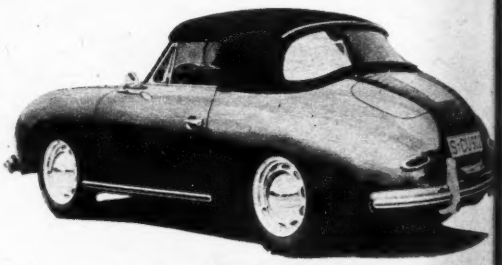
WHAT'S NEW AT THE FOREIGN

EUROPEANS are more economy-minded but just as avid auto fanciers as their American counterparts, if we can judge from the crowds that mobbed the auto shows in Paris, London and Frankfort recently.

As taxes and the cost of fuel are extremely high on the continent, the average European looks for a car that will give him a good mpg rate, minimum initial cost and low upkeep.

Thus such cars as the British Morris,

LAGO TALBOT is all-new, two-door, two-passenger sports coupe made by Automobiles Talbot, Paris. Boasting a V8 engine with 125 hp, French car has top speed of about 125 mph. Talbot has 98-in. wheelbase. Length is 164.5 in. Width is 62 in. Weight is about 2,204 lbs.



PORSCHE offers new convertible for '58 with detachable hardtop, improved engine, redesigned seats.

Car Shows

the German Volkswagen or the French Simca and Dauphine are his cup of tea. He can step up in class and price as his taste and wallet dictate.

However, as a glance at these pages reveals, the Europeans are also building luxury automobiles for the bon tons—some of them, like the Bentley, far costlier than any American car. Blimey, paisan, a garcon can dream, hein?

FACEL-VEGA is plush French job with 360 hp Chrysler engine. Cost: $9,750 in U. S.

FORE AND AFT view of Lago Talbot exhibits elegant French styling and lack of chrome embellishment. Deluxe sportster is slated for export to the U. S. in the near future.

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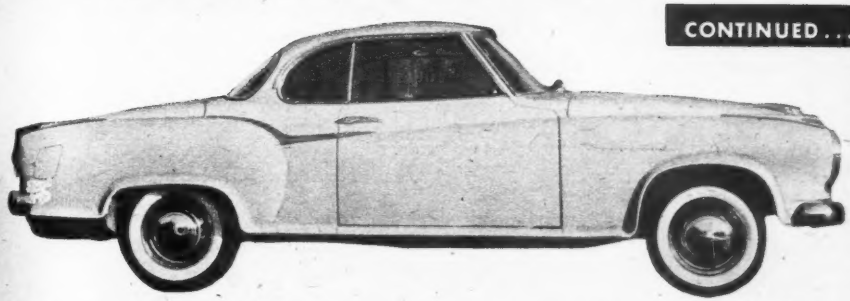
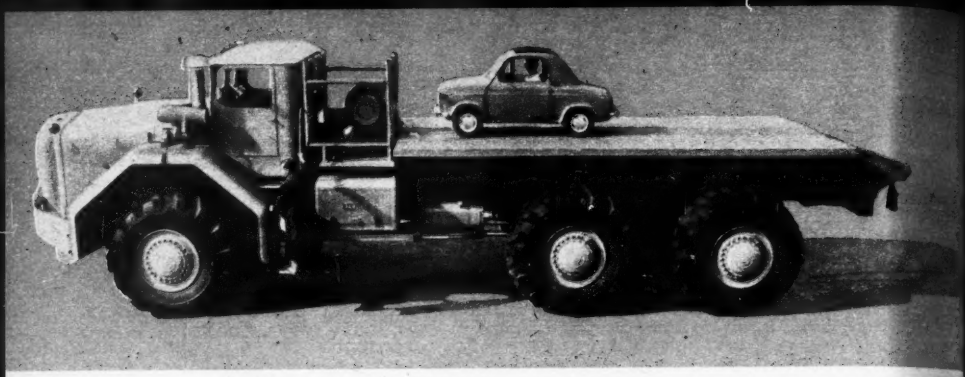


BORGWARD ISABELLA COUPE, shown at London, seats six, has 4-cylinder, 75-hp engine.



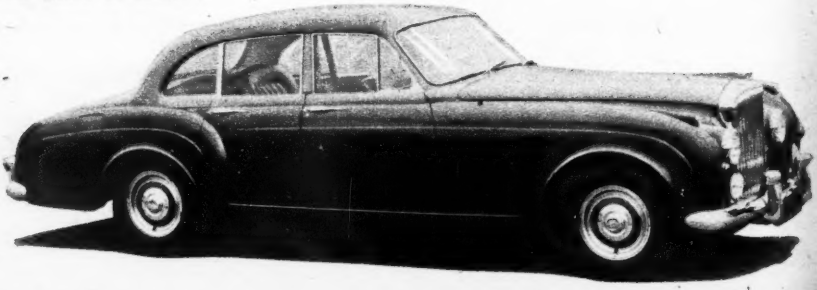
LARGEST AND SMALLEST at Paris auto show—French T-100 Berliet truck and wee Vespa.

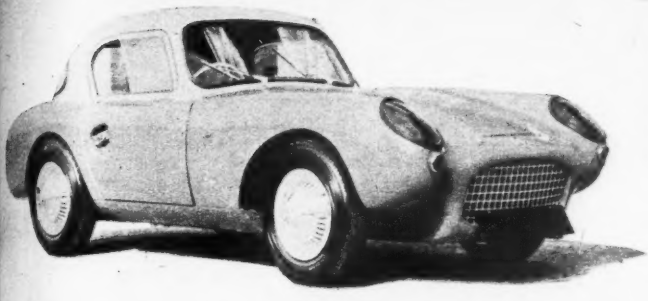
MORRIS OXFORD'S newest is four-door, six-passenger all-metal job. Car has 4-cylinder, 55-hp mill which gets about 26 mpg. Top speed is around 90 mph.

SAUCILY STYLED Alfa Romeo Giulietta special coupe is designed for racing. Italian bomb has reported top speed of over 140 mph.

SIMCA OCEANE convertible is two-seater. French car has 4-cylinder, 57-hp engine, top speed of 87 mph.

BENTLEY CONTINENTAL four-door sports saloon has a Rolls-Royce engine, seats five. Its price is $20,950.





BERKELEY is miniature British car with a four-speed gearbox. It sports Excelsior engine with top speed of 80 mph and has front-wheel drive.

VAUXHALL CRESTA was introduced in Europe by GM last year. It's a six-passenger car.

DREAM CAR. Oldsmobile's Golden Rocket, two-seater with plastic body and 274-hp engine, made a big hit at the Paris auto show.

ASTON MARTIN Mark III is two-seat sports car with a 6-cylinder, 202-hp engine with 120-mph top speed. Weight: 2,800 lbs.

MONEY MAKING IDEA

RARE BLACK-NECKS are a diminutive South American species. Cunningham, shown with a special pet, is looking for a cob (male swan) of this breed. He owns three females now.

By Robert Edwards

He Raises the World's TOUGHEST *Birds*

ONCE people ate swan. But with the price for a pair ranging from $85 to $500 more and more swan buyers have come to think of swans as "too pretty to eat." Swan buyers today are looking for something to make the old duck pond a little classier.

Lovers of grace and beauty find that swans are a very good buy. Swans are tough, long-lasting birds that take less care than the average parakeet. They stay out all winter, being north-country birds, and they live on a very sparse diet. When you put your money down for a pair of swans you know you have something because a cygnet, or young-

CUNNINGHAM'S LAYOUT is small by standards of bird farming but is the largest swan

CYGNETS are fiercely guarded by their parents. Swans are easy to keep but hard to breed.

ster, turns into a beautiful swan at the age of two years and stays like that for 50 to 100 years more. Even swan experts have a hard time telling a young cob (male swan) or pen (female) from a vintage model.

One of the places where you can buy swans is the farm of Ralph Cunningham near Seattle. Cunningham started out like many of his customers—by buying a pair of swans. He added them to some ducks and geese on a small pond at his suburban retreat. As he bought other varieties and their numbers increased, Cunningham built more ponds with fences and walkways. Now his swan farm has a dozen ponds and is the biggest in the U. S. He raises five of the world's seven species of swan. He sold his last ducks and geese years ago. "Too common," he says. "Swans are more of a challenge, too. Not everyone can breed swans. The swans you see in the local zoo, for example, will probably produce no cygnets. Too many other birds around. A pair of swans need to be left alone to build a nest and tend to their family."

For all their calm and poise, swans are hard to get along with.. Cunningham builds fences between the dozen ponds on his farm to keep the various species and groups apart. Swans can be mean despite their apparent serenity, particularly if another cob swims near a couple's fuzzy gray cygnets. Sometimes a cob takes off across the water like a sprint skater after Cunningham when he gets too near a nest.

Caring for his swans is one of Cunningham's simplest jobs. Most swans that die in [*Continued on page* 183]

farm in the country. Fences are needed to keep the peace among these pugnacious birds.

HERE'S HOW SHE DOES IT

FIRST, go soak your throbbing digit in hot water. It will help ease the pain. We told you not to attempt the intricate finger stand on page 66 until you had read the explanation. Oh well, some people never learn.

Here's how it's done and we must admit we were pretty tricky about the way we handled it. Actually, the curvilinear young lady isn't standing on her finger at all. Our bright photographer, as you can see in the photo, glued a cup and saucer to the ceiling and then had his man hold the chair against the ceiling. The girl, leaping from a platform, reached up and gently touched the ceiling with her finger. We cut the photo below the girl's feet and left in only a part of the chair—so you couldn't see the guy holding it. Then we printed the photo upside down. Pretty sharp, eh? •

MAKE YOUR SEDAN A CONVERTIBLE

FABRIC covering matches color of car, as does metal type, gives all-weather comfort.

HOLE is cut in roof before precision-made top, designed for your car, is installed.

SLIDING ROOFS for American cars are being installed by Golde Body Parts Division, Detroit, Mich. A draft-free hard or soft top, manually or hand-operated, costs from $298 to $498. •

PNEUMATIC BACK SEAT that can be deflated to make cargo room when you haul supplies. Richard Wexler, New York, N. Y.

SCOOTERMOWER—with this sit-down mower you can do the lawn, then ride away to town. Robert Petraska, Ida, Mich.

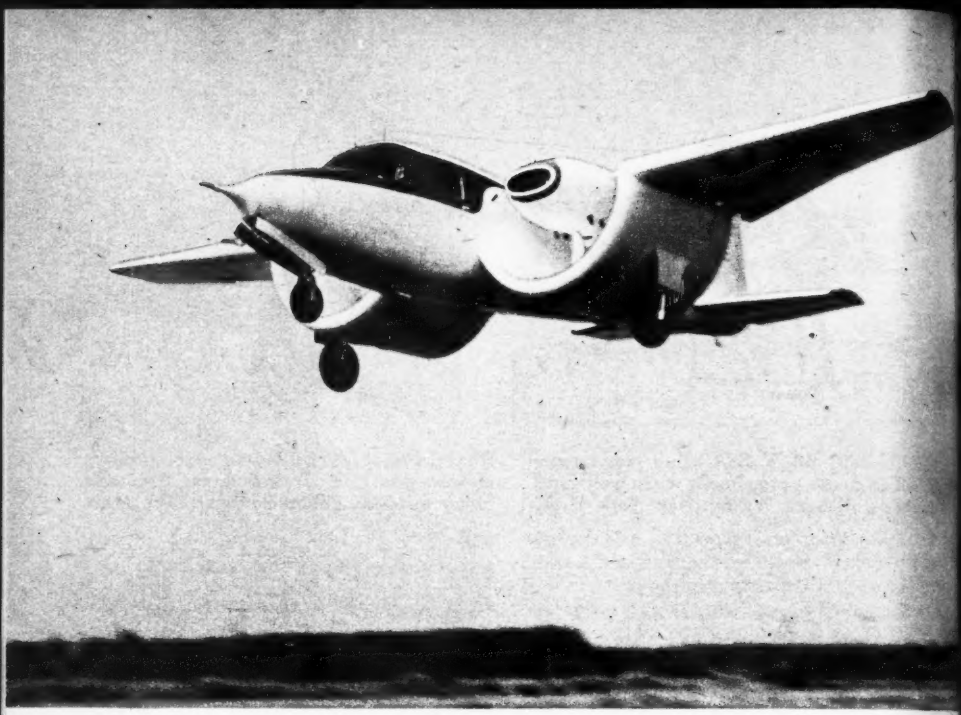
NAIL FEEDER—new way of packaging nails in a flexible strip for easier nailing operation. George Lierle, Jacksonville, Ill.

INVENTIONS WANTED!

Is there a gadget you think should be invented? If so, send its description to Inventions Wanted Editor, MECHANIX ILLUSTRATED, 67 West 44 St., N.Y. 36, N.Y. Each one printed will be awarded $5.

DENT-OUT MAGNET for pulling out body dents: no fuss getting behind the damaged part. Mrs. R. A. Boudreaux, Westwego, La.

PLUG-IN CARCOAT that plugs into the dashboard lighter—for winter sports car journeyings. D. A. Singer, Boston, Mass.



CHANNEL WING gives CCW-5 amazing stability, allows it to "hover" at 11-mph air speed.

PLANE LANDS AT 5 MPH!

By Rudy Arnold

A STRANGE-LOOKING flying machine that can land at five mph promises to make door-to-door commuting a reality for anyone who can afford a moderately-priced family car.

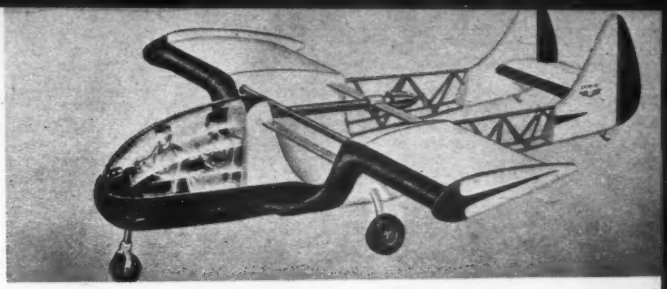
Its inventor, Willard R. Custer of Hagerstown, Md., literally watched his dreams go up in the air as the craft made its maiden flight at Oxenard, Calif., in the summer of 1954.

Onlookers gaped in amazement as the 4,500-lb. prototype with its twin 200-hp Lycoming engines took off in less than 200 ft., climbed into the sky at 3,000 ft. per minute, then circled the airport at 180 mph and came down to virtually hover at an air speed of only 11 mph.

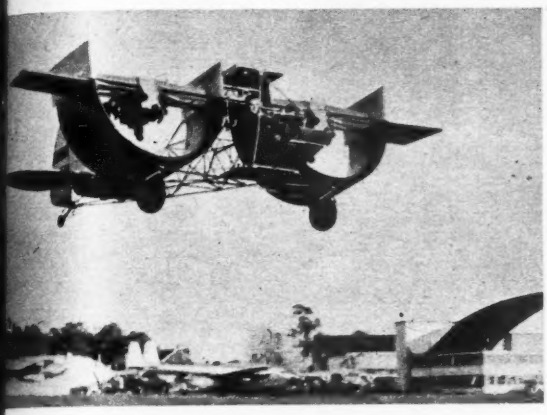
Custer's almost 30 years of hard work and research had finally paid off. The plane, dubbed CCW-5 (Custer Channel Wing), looks like a conventional aircraft except for its channel-wing design in which two half-barrel shapes form the section of each wing near the fuselage. Centered above each of these grooves or channels is a rear-facing engine. Special four-bladed props whirl close to the trailing edge of the channeled sections.

This design, according to Custer, exerts a tremendous lift on the U-shaped air foil sections. Besides the great lifting power, which Custer claims is twice that of comparable hp planes, the fast flowing air stream through the channels also helps to keep the machine remarkably stable.

Custer's aircraft has none of the stalling characteristics of the average plane which yaws, pitches, shakes or vibrates when it slows toward its stalling speed.



SINGLE-ENGINED CCW-2 is a two-passenger job. This little ship can take off and land in your yard!



PROTOTYPE of CCW-5, five-passenger craft, was successfully tested in summer of 1954. It proved the merit of unique channel-wing design.

The plane remains stable at almost zero speed because the engines draw the air over the upper wing surface creating an upward pull, even when there is no forward motion to the plane.

Says **Custer,** "A plane with this wing will take off readily. It will hover and yet will travel at the speed of any conventional airplane in its class."

Wind-tunnel tests with models at the L. H. Crook Aerodynamic Laboratory in Washington, D. C., showed that Custer's wing would glide longer and land slower without stalling than any known wing.

The Custer Channel Wing Mfg. Co., Hagerstown, Md., expects to go into production sometime early this year. They hope to deliver the first production models sometime after the middle of the year.

Present plans call for two models, the CCW-5, a five-passenger craft designed for executive use, and a smaller two-passenger version, the CCW-2. The CCW-5 is [*Continued on page* 168]

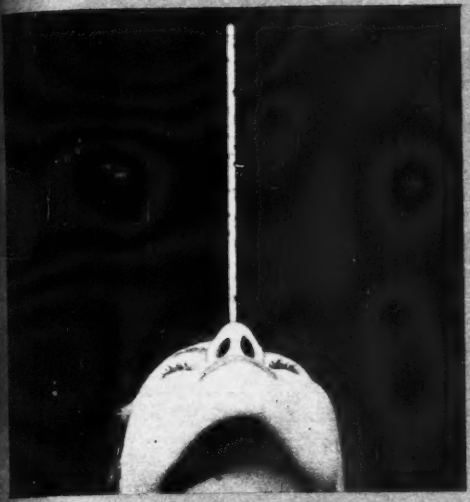
SLEEK CCW-5 and its little brother, the CCW-2, are scheduled to go into production early this year and be ready for delivery before end of 1958.

MAGIC KNIFE cuts cake into eight portions with three cuts. Boy Friend watches doubtfully as Dizzy Chick cuts cheese cake into quarters, places quarters atop each other, triumphantly makes last cut. See, Smarty Pants?

Be a Parlor Houdini

If you'd like to have a few tricks up your sleeve, here are some nifties requiring no skill and no practice.

BRIGHT BOY gets back by blowing down left sleeve to put out wooden match in right hand. Here's how he did it: holding the match so that he could flick it slightly while he blew created excellent illusion. You try it.



PERFECT BALANCE achieved by the Dizzy Chick looks mighty suspicious to Boy Friend—and he's right. She has underhandedly stuffed a wad of choon gum up one end of the straw. Such is the Deceitfulness of Woman.

POWER OF A DOLLAR is shown by folding it very carefully (to give it rigidity, you pretend) and whamming it down on the pencil in playmate's grip. How? Bright Boy's big strong index finger provides the clue.

THE '58 C

"Hot, plush, rugged and durable" is Tom's opinion of these cars after hundreds of miles behind the wheel.

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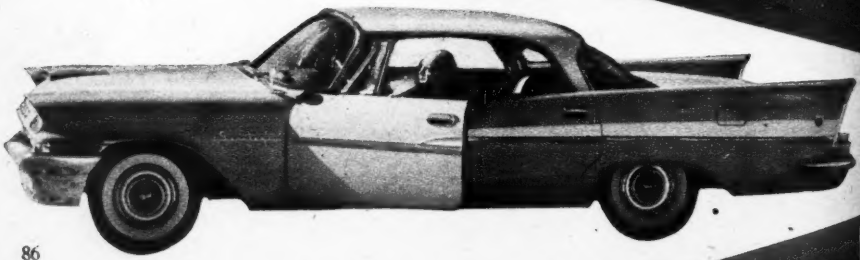
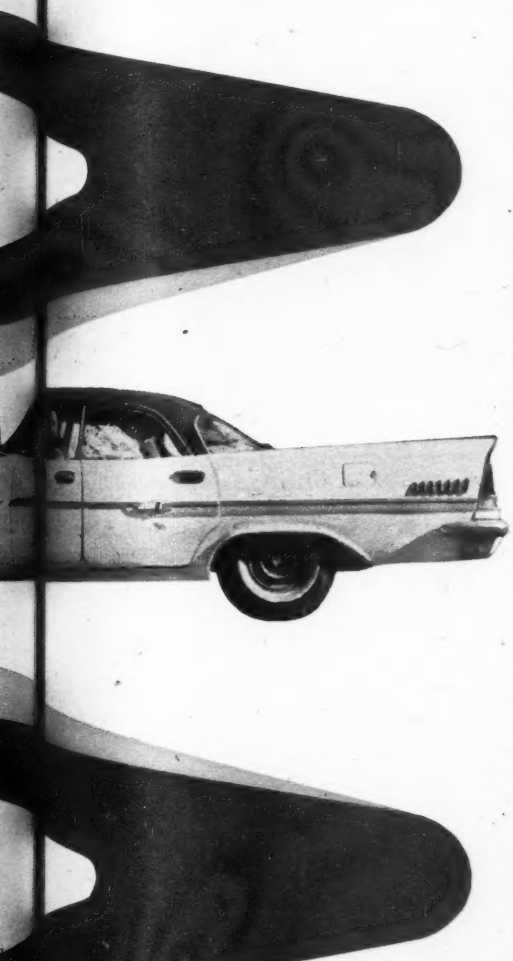


CHRYSLERS

By Tom McCahill

CHRYSLER LINE, top to bottom: Windsor, New Yorker, Saratoga. Luxury-laden New Yorker leads parade with 345-hp engine. Windsor and Saratoga have same engine but dual-carburetor Windsor belts out 290 hp; four-barrel carburetor Saratoga, 310 hp.



THE 1958 Chrysler test started immediately upon my arrival recently in Los Angeles. I had been hired to conduct a series of tests on a number of 1958 cars, including the entire Chrysler line as well as many of its competitors.

I selected a 1958 Chrysler New Yorker as my own personal car while on the coast and racked up hundreds of miles running over mountain passes, across deserts, in blinding snowstorms and through L.A.'s famous smog-bound traffic. Jim McMichael took a '58 Saratoga as the second car in our caravan. When the tests began in earnest at the foot of Mt. Whitney, North America's peakiest peak, things began to happen —but fast.

At our base of operations we had more than a dozen 1958 cars of various makes, all of which were put through the same tests. Without disclosing brand names (as this was an independent, paid-for test I have no right to reveal the makes tested) I can tell you that several of the cars became so unroadable, ruptured and generally disabled that they had to be *trucked* back to L.A. Their ailments consisted of twisted frames, a collapsed air suspension system, all shock absorbers gone and coil springs unanchored.

If this sounds like a mobile Battle of the Marne, it was—and the damage and expense were fantastic. But the knowledge gained could not have been obtained any other way. I point all this out because none of the Chrysler Division cars failed or became disabled. Over fantastic torture roads at high speeds they did get a little loose, and maybe a bit lower, but there was no malfunction. Though my New Yorker and McMichael's Saratoga went through all these tests several times, we were still driving them when we left. One or two members of the competition will never be the same again.

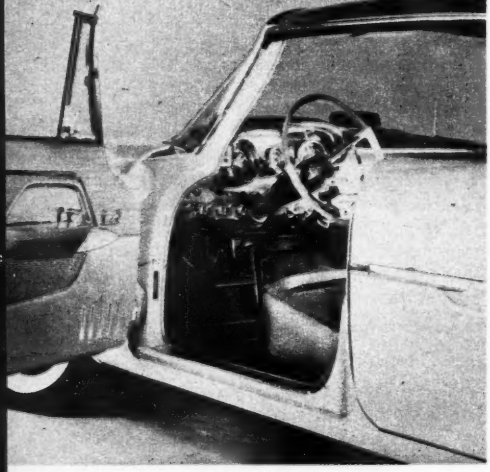
This report concerns the Chrysler New Yorker specifically but before we focus our little gimlet eyes exclusively on that model, let me point out that

CHRYSLERS

the Windsor and Saratoga offer most of the features of the New Yorker with much happier price tags. The big difference between the Windsor and Saratoga (both powered by 354-cubic-inch engines) is in the carburetion. The Windsor with a dual carburetor belts out a supposed 290 hp and the Saratoga with a four-barrel carburetor is rated by Chrysler at 310 hp. The New Yorker, on the other hand, has an earth-cracking 392-cubic-inch engine rated at 345 hp.

In drag races I conducted among all three models there was no question about the New Yorker's power superiority. Though the Saratoga clobbered the Windsor slightly, the New Yorker chewed both of them into little pieces. On one particular 300-mile run with the Saratoga, however, I was forced to admit I couldn't see any reason why a sane Zombie would need any more power for traveling. At a full 100 mph, for a great many miles, driving the Saratoga was as much fun as getting a salary raise and there wasn't the slightest sign of road wander or high-speed gallop. This is a great road car to travel in. But now on to the New Yorker test.

HANDLING and roadability are tops, says Tom. "No car will take a harder beating."



SUMPTUOUS New Yorker has living-room-like interior with deep and comfortable seats.

The wind was screaming at close to 60 mph and snow was in the air when your Uncle Tom (being a full-blown lunatic by birthright), my wife and Jim McMichael decided to go for a ride. Though it was after 10 p.m., we headed for Mt. Whitney and the "Portal." This is where the road ends and you have to get out and walk if you want to go any higher. It is a pretty sporty road, even in broad daylight and without snow, but we started.

After climbing to about six or seven thousand feet the snow started coming down in earnest and the road began to ice up.

Near the top of the run the road becomes as twisty as an organ grinder's mustache and the ice wasn't calculated to soothe any feelings. Just the wrong zig instead of the right zag on these narrow passages and we'd have dropped down two or three thousand feet of cliff in the damndest broadslide since the

collapse of Minsky's runway. We spent some time at the Portal with the engine turned off, trying to hear a coyote or some other form of wildlife, but pulled a blank on that score. Oddly enough, there was no wind at all, though it never stopped screaming in the valley. It was as dark as the inside of a mailman's kidney and the only "wildlife" around was us.

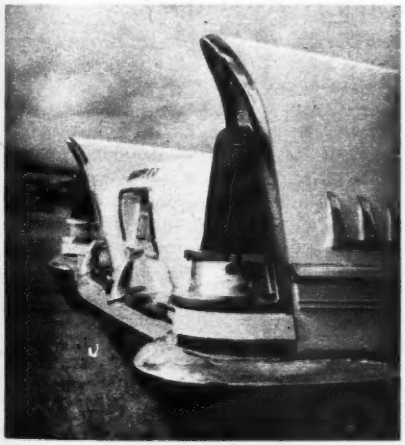
By the time we started down, the snow had piled up quite a bit but after one or two slight cases of breakaway in the tail (which were stopped by gentle counteract turns) I soon had all the confidence of a guy with a royal flush in a five-card stud game. We were higher than a heroin taster on Saturday night but the trip down was uneventful. I point this out not to prove what a hairy-chested "Gung Ho!" character I am, but to illustrate the confidence we developed in this New Yorker, even though we were nuts to do it on such a dark, icy and snowy night.

During almost four weeks that I lived with this car I got a chance to drive it under just about every condition known to the so-called civilized world. During tests conducted in the daylight hours, this same New Yorker, without adjustments, was subjected to extreme panic brake stops and hard cornering tests and was driven at speed over roads with more bumps and snags than your income tax form. The "torture road" was man-made out of ramps that sometimes had all four wheels of the cars off the ground a foot or more. Some of the ramps were designed to catch the full force of the car on the front wheels first and the next time on the rear wheels.

As I said, the car was loose when I was through with it and maybe an inch or so lower. But everything was in perfect order [*Continued on page* 169]

McCAHILL TESTS

CAR TESTED: **1958 CHRYSLER NEW YORKER.** Engine: **V8** cyls; **392** cubic ins; **345** brake hp; **450** ft-lb max torque; **10** to **1** compression ratio. Wheelbase **126** ins; height **57.3** ins; width **79.6** ins; overall length **220.2** ins. Gas tank capacity **23** gals. PERFORMANCE: 0-30 mph, **3.4** secs; 0-50, **6.9** secs; 0-60 mph, **8.8** secs; 40-60 mph, **4.8** secs; 0-70 mph, **12.0** secs. Top speed **125-plus** mph. All times recorded on corrected speedometer.



STYLING of '58 Chryslers shows minor changes from '57. Taillights have been modified, dual headlights are now standard equipment and grille has been redesigned, extending around front fenders.

UNCLE TOM'S ready to start trip. He takes four dogs in two-car safari with all vital gear.

McCAHILL'S TIPS ON TOURING

Trip-taking do's and don'ts from the McCahill log of over 2,000,000 miles.

By Tom McCahill

HITTING the road is more American than apple pie and several times as popular as baseball. Since World War II America has become a nation on wheels in which some 56,000-000 cars haul travelers and tourers all over the map.

The traveler type, which includes the writer, drives thousands of miles every year on business, the object being to reach his destination in the quickest possible time without getting killed, maimed or compromised. The tourer, on the other hand, is the motoring drifter. He may be on a leisurely vacation or may be retired and wants to make sure there's nothing left in the country he hasn't seen. He stops at every monument, tries every highly-recommended restaurant and may take as long as ten days to do 1,200 miles.

As there is no set formula for advising you how to waste time, this thesis will concern itself with the business traveler and the vacationer with a specific trip in mind and a limited time allowance.

I started making fast distance trips back in the days of Calvin Coolidge and have written many articles on the subject. For a long time I've been hollering for a "Duckshooter's Start"—recommending getting on the road a good hour before daylight. For many years

a few other lunatics and I were the only ones bowling down the highway at this hour—usually at 70 mph-plus as the roads were then cop-free. Such a start meant getting 300 miles under your belt before noon. And if you had a thermos of hot coffee and a few sandwiches, you could avoid that deadly hour-long lunch that turns the finest average speed into a snail's crawl.

As I write this, I've just completed another long run and was shocked by the hundreds of people who were following the methods I've been advocating for years. At 4:45 one morning I was running my dogs in back of a large motel in North Carolina when I was forced to call them in because three other people, staying at the same motel, were running dogs at the same time! When I pulled away at 5:10 for the day's run, 80 per cent of the occupants of this huge court (which had been full the night before) had already left ahead of me!

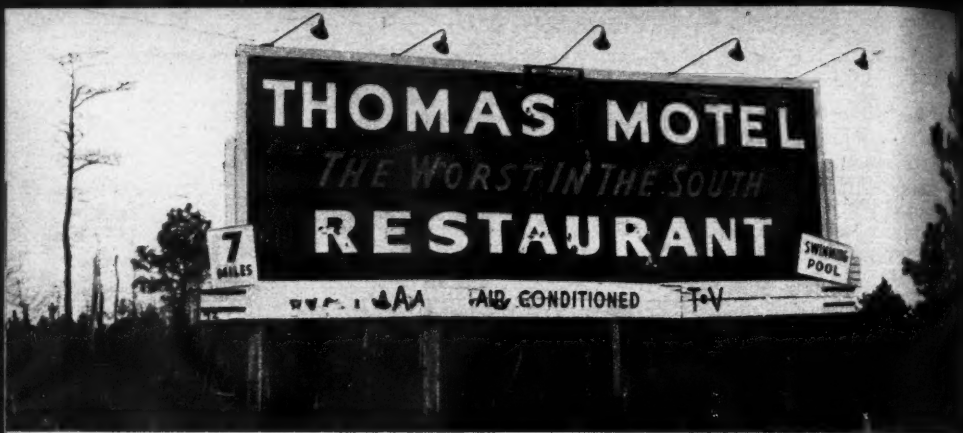
This was a holiday crowd making a quick run for Florida. They had learned, heard or read that this was the way to do it—but it turned out, it wasn't. In the first 50 miles I spotted four patrolling state police cars and several local police cars—something you never saw in the wee hours a few years ago. Bad passers were piling up behind each other and, in the darkness, were puttering along at a good 15-20 mph below the legal speed limit of the highway.

FILL 'ER UP the night before, warns Tom. Gas stations often open late in morning.

This was the second morning of the trip this had happened to me. Now I was forced to take counter-measures which worked out very well. I knew the routes that the AAA and other automobile clubs recommend to their members for traveling south. At the first juncture I elected to do just the opposite, with excellent results. I got off the recommended route and took to the secondary roads, usually running parallel to the heavily-traveled turnpikes.

On the auto club route, as the day pro-

LIGHT TRAFFIC on free roads parallel to turnpike often let you make better time.



GAG SIGN is fun but Tom advises a good look around the motel before you check in.

gressed, all small towns were jammed to the hips in slow, creeping traffic, resembling an army en route. Never, during a holiday or vacation season, take the route advised by auto clubs unless you're just crazy about being in parades. You'll make much better time by leaving the pike and taking to the parallel free road.

Now for some thoughts on the best way to make a fast vacation or business trip—and by "fast" I don't necessarily mean breaking any speed limits. We're not going to insult your intelligence by outlining the fact that your car must have good tires, brakes and be in top mechanical condition. I'll just attempt to point out a few of the things I've learned in 2,000,000 miles in the driver's seat.

Very few drivers (even pros) are aware of the fact that the acceleration and pick-up of their cars are sliced from 20 to 40 per cent when the cars are loaded to the gunwales. A car that can do 0-60 mph in ten seconds may easily take as long as 13 to 14 seconds when the trunk is jammed with heavy baggage and you've added two or three more passengers. Many really good drivers have learned this too late when they pulled out to pass a long line of slow-moving cars and suddenly found that Old Nelly no longer had the oomph.

To illustrate this another way, you probably know pretty well just how much space you usually need to brake your crate down to a halt from a full 60 mph. But when your car's loaded and you try to pull her down in the normal distance, your brakes may suddenly turn "greasy" and the only way you can stop quickly is to find yourself a stone wall.

Among the many annoyances the traveler must get accustomed to are the poorly marked signs, route numbers and speed limits in many sections. For example, it's possible to go for almost 100 miles in some western states such as California and never see a speed limit sign. And if you ask a cop what it is, he'll tell you 55 mph—even though most of the cars are traveling close to 100 mph out in the desert country.

In many spots in the Carolinas, especially North Carolina, you see signs that read "Speed Electrically Timed" or "Radar" but you'll see few Speed Limit signs. In some other sections, such as in Georgia, you'll see "25 mph through town" and once you pass through town and into open country again nothing advises you that you're still in the speed zone. Suddenly, a good mile or so beyond visible habitation, another 25 mph speed limit sign will pop up. This type of sign is to allow the minion of the law an immoral legal right to pull you in for the enrichment of the local town treasury.

This year many sections of the country are crawling with more and more unmarked police cars. An old observation of mine saved my skin just two days ago. I was closing in on an unmarked car, fast, and was just about to take him at a good ten mph over the limit when my eye caught the driver from the back. I couldn't see his uniform or even his

state police hat but the way he was sitting at the wheel tipped me off. Most state cops and highway patrolmen when on duty sit very erect and rarely slouch against the door. Most civilian drivers, especially on a long trip, slouch somewhat to relax. The driver's posture may be all the hint needed to keep you out of the hammy fists of John Law.

Here are some more tips that might be helpful on your vacation trip. We just proved again for the umpteenth time that carrying 32 lbs. of air in your tires rather than 24 lbs. can mean as much as two extra miles per gallon of gas and much surer and safer handling in a pinch. Also, your tires will probably last 30 per cent longer.

If traveling during the holiday or vacation season, it's smart to phone ahead for motel rooms. Motel prices vary like the contents of hash—and many change rates from hour to hour, depending on the demand. I find that in most sections of the country motels of a certain association remain consistent in their quality, stand by established rates and will even wire reservations ahead to a brother motel for your next stop. For example, in the East I've found that members of the Quality Courts Association are excellent. I've only hit one bad one in almost ten years of staying with this group.

When casting around for a place to stay at night without a reservation it is usually my custom to inspect the rooms before signing up. It's amazing how a clever arrangement of neon lights can improve a Tobacco Road motel after dark. Another item—some of the newer motels are 100 per cent air-conditioned, whether you like it or not. This means the windows positively will not open. In some of these I have gasped through the night in hot weather because the air conditioning was inadequate and I have frozen in cold weather when the combination heating-conditioning unit didn't produce enough BTU's to alter the contour of an ice cube in any given week.

If you're traveling with kids or dogs, a five-gallon bottle of water *from home* is a must in some sections of the country. The local water, though probably free from typhoid, is often bad enough to cause nausea in a hyena. My dogs

ONE-HORSE town with 25-mph speed limit is irksome and unnecessary in Tom's opinion.

have actually gotten sick from the water in Dearborn, Mich. and some spots in Ohio. No man following the field trial circuit would dream of going without his own water supply—and if water can sicken a dog, imagine what it can do to you.

Food is another catch-as-catch-can proposition. When looking for a restaurant, try and spot a place where the better class of local cars are stopped. Local knowledge is a great thing in avoiding ptomaine, which my wife once got in a highly-touted turnpike restaurant chain. Take along a flashlight. And if you're going to travel in the South, a snake-bite kit is a smart thing to have. [*Continued on page* 169]

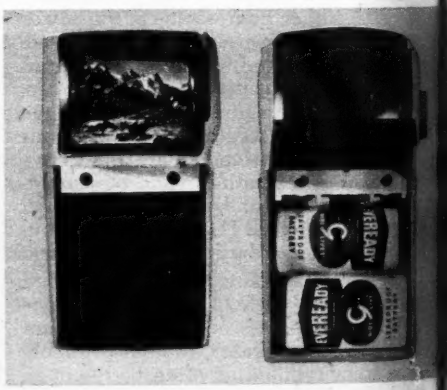
PHONE AHEAD for motel reservations whenever possible. It saves time and trouble.

PHONOGRAPH-RADIO combo plays 6,000 records on one set of batteries.

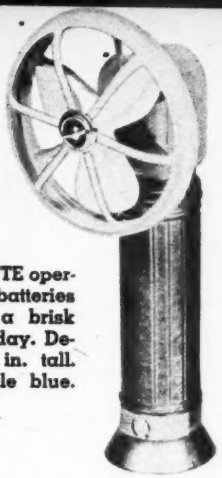
IT'S ALL DONE WITH BATTERIES

LAST year more than 70,000,000 flashlight batteries were sold—but if you think they were all for flashlights, just take a look at the unusual and novel gadgets on these pages. They all use dry cells in the AA, C and D sizes. •

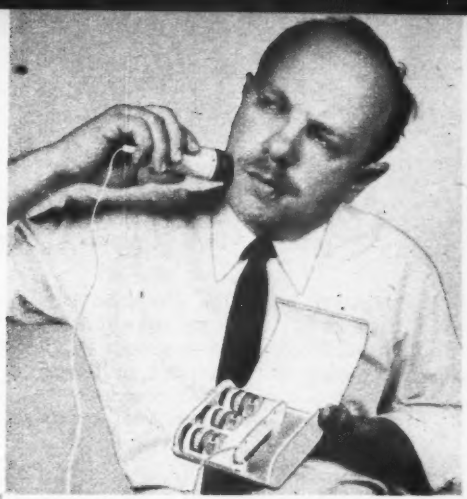
TWIRLING BRISTLES spruce up dirty shoes.



EVEREADY batteries light film slides.



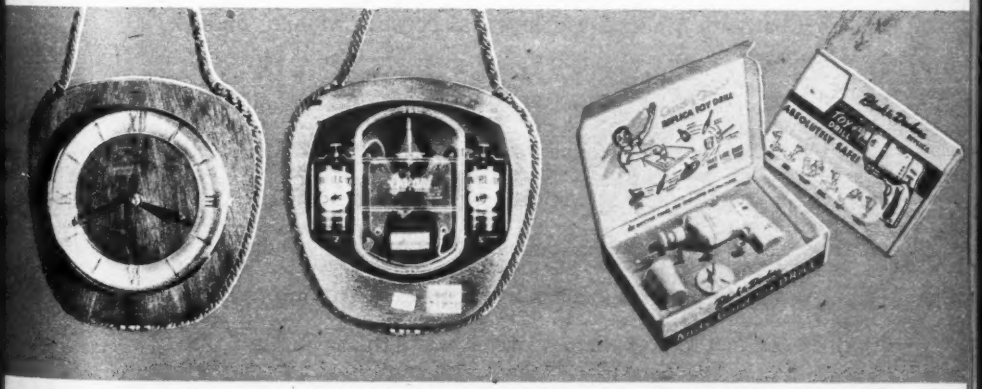
HANDY FANETTE operates on two batteries and provides a brisk breeze on hot day. Device is seven in. tall. Its color is pale blue.



BATTERY POWER runs this Selmor shaver.

HEAVY DUTY battery whirls this blendor.

LIE DETECTOR, Abercrombie & Fitch device.



WALL CLOCK has heavy duty dry cells.

TOY DRILL let's Junior do it—safely.

WHO THOUGHT OF IT FIRST?

By Bernard Seeman

NO matter what the Russians say, they didn't invent *everything*—though admittedly it is sometimes difficult to decide just who was first with discoveries in the world of science.

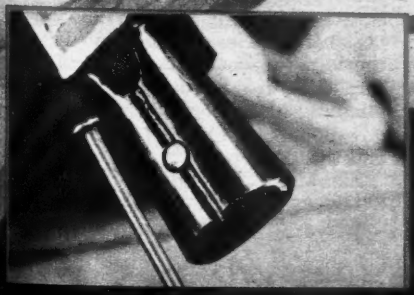
Listed below are some real brain-twisters that challenge your knowledge of the history of science. Read them over carefully and answer True or False. But take your time answering because this is a quiz on "Firsts" that demands second thoughts! •

	TRUE	FALSE
1. First bifocal glasses were made by Benjamin Franklin.	☐	☐
2. First cannon-carrying tank was used by British in World War I.	☐	☐
3. First non-stop transatlantic flight was made by Lindbergh.	☐	☐
4. First workable motor car was built before 1776.	☐	☐
5. First man to send a message by telegraph was Samuel Morse.	☐	☐
6. First powered *model* airplane to fly was built in 1848.	☐	☐
7. First telescope was built by Dutchman Hans Lippershay.	☐	☐
8. First man to see the Antarctic was Capt. Cook in 1772.	☐	☐
9. First sewing machine was built by Elias Howe in 1846.	☐	☐
10. First cannon was invented by a German monk.	☐	☐
11. First parachute jump was made before 1800.	☐	☐
12. First people known to have used opium were the ancient Greeks.	☐	☐
13. First battle of armored warships was between Monitor and Merrimac.	☐	☐
14. First successful steamboat voyage was made in Scotland.	☐	☐
15. First picture scanner for television was developed in 1932.	☐	☐
16. First man to develop atomic theory was Einstein in 1919.	☐	☐
17. First use of the Zero in mathematics was in ancient India.	☐	☐
18. First man to discover medicinal properties of aspirin was Bayer.	☐	☐
19. First steamer to cross the Atlantic was the Rising Sun in 1818.	☐	☐
20. First use of rockets as weapons was in War of 1812.	☐	☐

ANSWERS ON PAGE 180

MIMI

MIMI—who knows a good thing when she sees one—wants you to take a look at the Magna-Head hammer, a new tool that solves the problem of smashed fingers. The Magna-Head (see photo below) has a small magnet set into the head. It holds the nail firmly and allows you to start it, then drive it home securely using only one hand. Made by Royal Line Products, Inc., Mountainhome, Pa., five models retail from $3.69 to $5.00. •



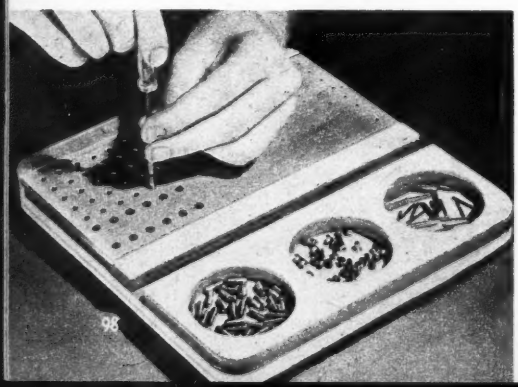
JOB TESTS are often given to groups—with desk partitions to insure privacy.

All About Job Tests

By Julien Steinberg

IF you work for one of the few big companies that haven't started extensive personnel testing, you're in for a treat. Sooner or later your boss will get a testing outfit to come in and run a program and set up tests to be given to all job applicants and employees. After that—if you haven't lost your temper and quit, and you probably won't—the heads of the Big Happy Family you work for will know more about you than you do yourself.

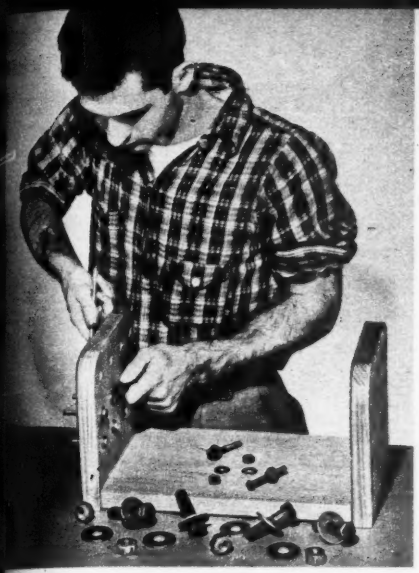
EYE-HAND DEXTERITY is measured by putting small screws in threaded holes in plate.



The tests now in use fall roughly into three categories. There are those that test your natural ability—they're called aptitude tests. There are the achievement tests that tell how much you know about a certain job. And newest and gaudiest of them all are the personality tests, that tell things about you that only priests, doctors and lawyers were once allowed to know.

Aptitude tests are supposed to tell the bosses what job you'd be worth training for. One type tests your common-sense judgment. It does so by asking you simple questions and giving you four possible answers for each one. Three of the four answers are more or less correct. To make sure that you're not guessing, the testers want you to mark down the best answer, the second best and the third best.

Sample: "Why do football players



HAND-TOOL TEST requires applicant to use both hands to fit nut swiftly onto bolt.

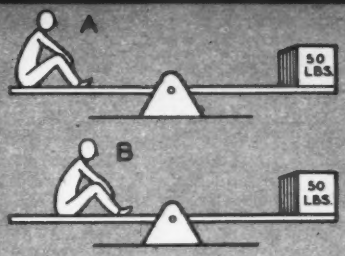
wear padding?" (a) To make them look more formidable; (b) To protect themselves against injury; (c) To be able to hit opponents harder; (d) To increase their weight. (Answers: b,c,a)

Sample: You're shown a cannon and a soldier facing it. The distance between them is five miles. You're asked for the one correct ending to this statement: The soldier will hear the sound (a) before he sees the flash; (b) after he sees the flash; (c) at the same time as he sees the flash. (Answer: b.)

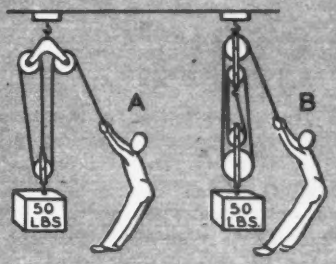
There are aptitude tests to uncover your flair for words. Others want to find how you handle, or think about, numbers. Still others test your learning speed, your imagination and your memory. [*Continued on page* 170]

ANSWERS

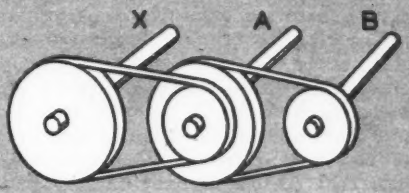
Photos and diagrams on these pages are copyrighted by The Psychological Corp., one of the largest test suppliers in the U. S. Correct answers to diagram tests: 1-B. 2-B. 3-C. 4-A. These tests are designed to rate scientific and mechanical aptitude.



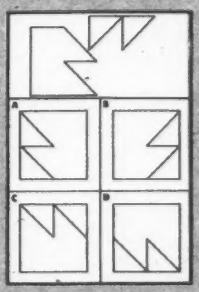
1. WHICH BOY, A or B, is heavier if both seesaws balance? If the weight of both boys is the same, answer C.



2. WHICH MAN, A or B, pulls in more rope to raise boxes an equal distance? If both ropes will be equal, answer C.



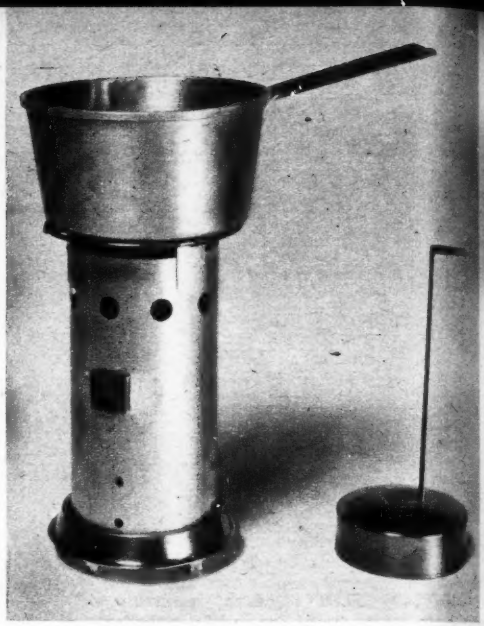
3. WHICH SHAFT, A or B, will turn at same speed as shaft X? If neither will turn at same speed as X, then answer C.



4. WHICH FIGURE—A, B, C or D—can be made from two jigsaw pieces at top of diagram? You cannot flop pieces over.

MECHANIX ILLUSTRATED
BRIGHT IDEA AWARD

"LITTLE CHIEF" STOVE



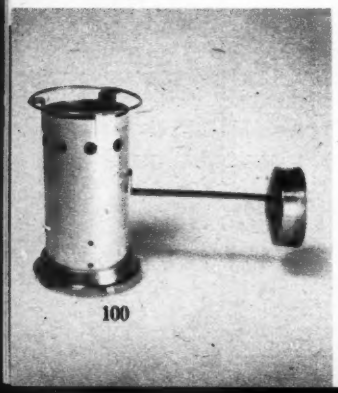
COOKING is safe and a snap in camp, duck blind, work shanty or car with spillproof, explosion-proof stove.

THE fuel for this simple camp stove can't spill or explode, can be kept indefinitely and can be lit, snuffed out and lit again as needed. It burns steadily in wind and rain and it's sure fire for kindling wet firewood. When using the stuff as kindling you cut it up with a knife. It also makes a fine flare or lantern for use on the highway. Any one who has need of a handy camp stove will agree that this safe little number has the features most desired. Curry Company, 1731 Altura, Denver 8, Colo., is the teepee Little Chief comes from. •

WIN $50

MI will award $50 each month to the first person who tells us of a new and useful gadget that is patented and in production. Manufacturers are also eligible for this award. Pictures and a description should be sent to Bright Ideas Editor, Mechanix Illustrated, 67 West 44th Street, New York 36, N. Y.

SNUFFER serves as handle when Little Chief gets too hot for fingers. Fuel is a solid cake that can be cut up for starting wet wood fires. The stove with three cakes of fuel costs $4.95. Fuel cakes cost $1.25 for five, can be used as emergency lights and warmers.

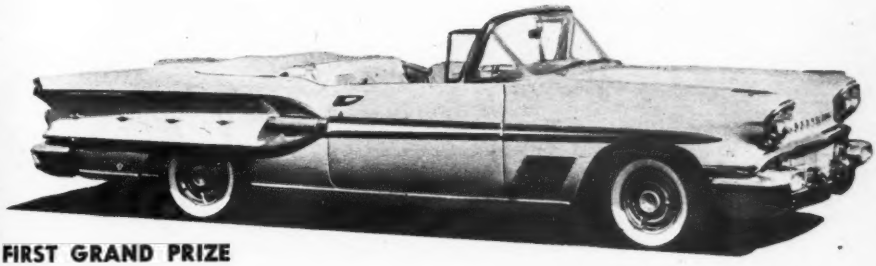


MI's Fabulous

$75,000 CONTEST!

SIX BEAUTIFUL 1958 PONTIACS
AND 355 OTHER PRIZES

ARE you a good judge of your fellow man—especially of his tastes in reading matter? Then MI's $75,000 Contest is just the thing for you for it offers a chance to test your knowledge of human nature—and possibly win a brand-new 1958 automobile, an exciting trip to Alaska or any one of 361 wonderful prizes. From lists of 15 major articles in three issues you simply pick the five you think most people will like best. Now look over the prizes on the next ten pages, study the rules carefully and you're ready to start. •



FIRST GRAND PRIZE

1958 PONTIAC BONNEVILLE convertible with power steering and brakes, Hydra-Matic, radio, heater and other extras. Worth about $4,250 delivered.

SECOND GRAND PRIZES

FIVE 1958 PONTIAC STAR CHIEF four-door Catalinas, perennial favorite with the car-buying public. Beautiful sedan comes with Hydra-Matic, power brakes and steering, radio, heater and other extras. Worth about $3,900 delivered.

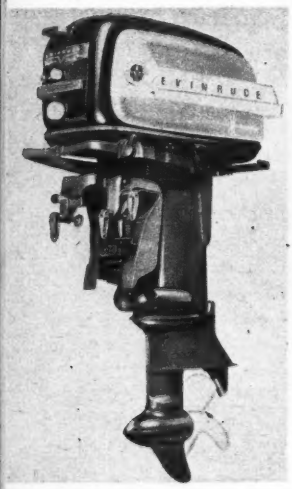
PRIZE LIST CONTINUED ON NEXT PAGE

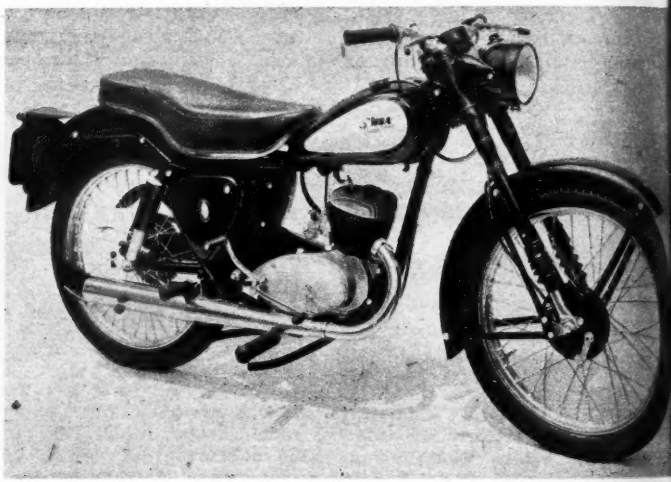
7th PRIZE

PAN AMERICAN WORLD AIRWAYS, World's Most Experienced Airline, takes you on a $2,000 wilderness fishing trip to Alaska and the Arctic Circle; boats, guides, gear—the thrill of a lifetime!

BSA Model D3 Bantam Major motorcycle, British-built champ of economy with two-person seats and smooth-riding suspension—$463 delivered.

11th-14th PRIZES





10th PRIZE

EVINRUDE 35-hp Big Twin electric-starting outboard, the favorite of high-performance engines—powerful but quiet. Worth $585.

GENERAL MARINE M-112 Torpedo, the fast 12-ft. runabout with big-boat features. Ready for the water. Priced at $422.

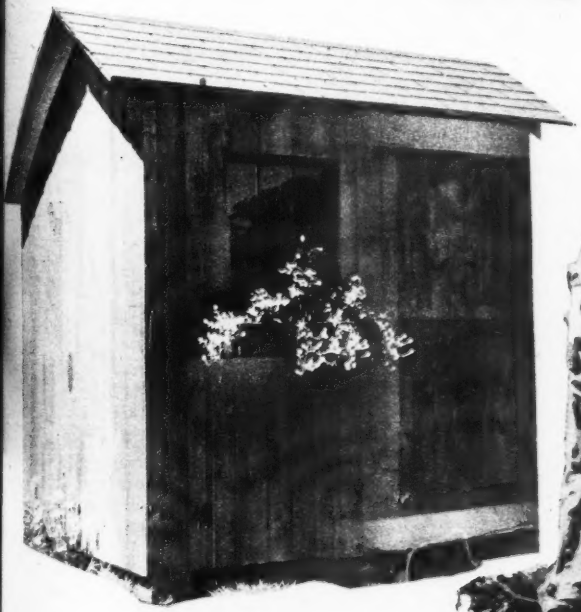
15th-16th PRIZES

8th PRIZE

LONE STAR'S 16-ft. cruisette, the Holiday. Versatile and smooth craft has roomy 6x12 ft. car-style cockpit. Less motor and top. "A $995 gem."

9th PRIZE

WAGEMAKER'S beautiful 14-ft. Ply-Lap clinker-built boat is double hulled—lapstrake over molded plywood. Brand-new on the market. Less engine—$750.



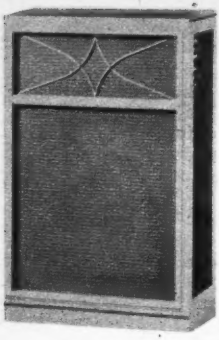
17th-20th PRIZES

MOHAWK LOG CABINS of New York presents a knotty pine pre-fab cabin for a tool house, backyard study, overnight shelter for hunter, etc.—worth $350 delivered.

21st-25th PRIZES

GRAVELY home-garden tractor, powerful 5-hp workhorse for a variety of jobs; 30 attachments available. It's easily handled and maneuverable—tractor only, $339.

Contest arrangements by The S. Jay Reiner Co., Inc.

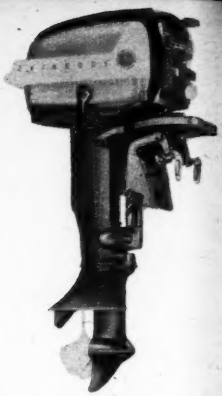


26th-27th PRIZES

JENSEN Tri-Plex TP-200 Reproducer, complete three-way hi-fi speaker system in lovely cabinet—$329.50.

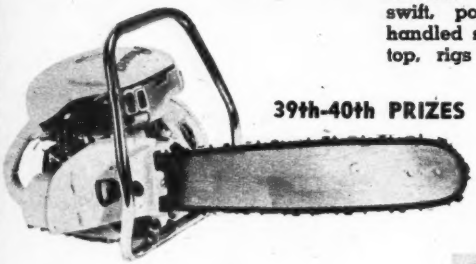
28th-29th PRIZES

ALCORT Sailfish, America's swift, popular and easily handled sailboat; fits on car top, rigs in a flash—$317.



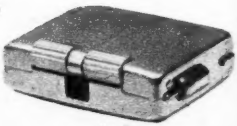
30th PRIZE

EVINRUDE 10-hp Sportwin with the Roto-Matic speed control; fast, quiet—$310.



39th-40th PRIZES

PIONEER model RA chain saw, a lightweight that is rough and tough, fast-sawing and yet safe; you can use it anywhere—$260.

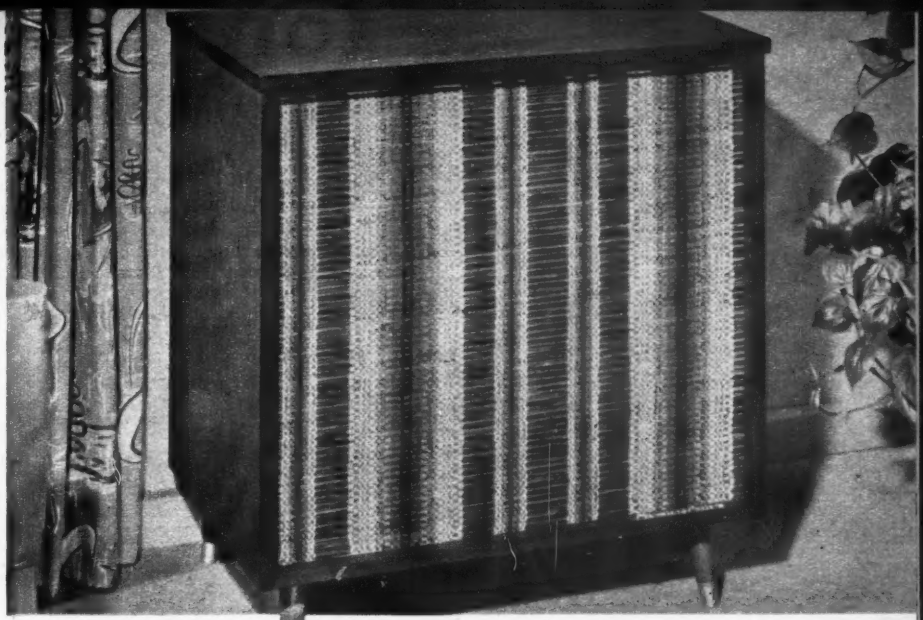


41st-45th PRIZES

LA PRIMADORA's $212.50 award of 50 famous Optimo Kings, finest Havana cigars, and a solid gold Stratoflame butane gas lighter, a jewel of beauty.

46th-55th PRIZES

HELBROS "celebrity watches" with 17 lifetime jewels and an unbreakable mainspring. Winner has choice of man's model carrying 11 diamonds or lovely woman's model with 24 sparkling diamonds—$200.

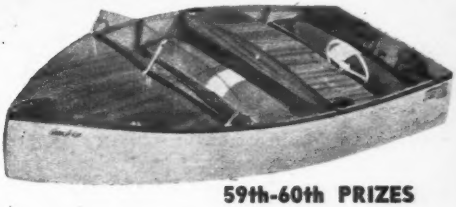


31st-38th PRIZES

STROMBERG-CARLSON Jubilee hi-fi with 4-speed changer, AM-FM radio—$309.95.

56th-58th PRIZES

JENSEN Tri-Plex do-it-yourself speaker kit; all parts and enclosure plans—$169.50.



59th-60th PRIZES

GENERAL MARINE KB-14 deluxe Speedliner, a 14-ft. family runabout kit worth $169.

61st-64th PRIZES

McCULLOCH model MAC-35 chain saw, rugged 20-pounder that is multi-purpose, dependable and safe; high performance, low-cost to run. Handy prize valued at $165.

65th PRIZE

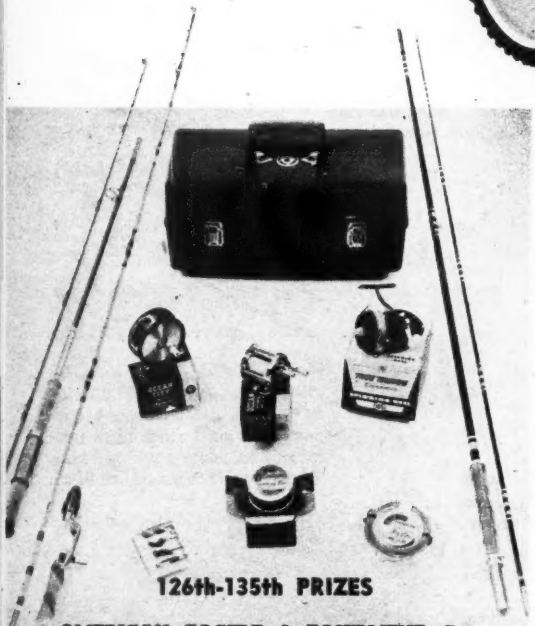
EVINRUDE 3-hp Lightwin with famed Fisherman Drive; it goes and stows anywhere—$160 value.

66th-69th PRIZES

NATIONAL SCHOOLS gives you one of its famous home study courses, the easy way to learn a trade. Choice of Radio, TV, Electronics, Auto or Diesel—$159 per course.

70th-89th PRIZES

HOMKO THUNDERBIRD self-propelled rotary power mower is rugged, will go anywhere. Machine has front-wheel drive, two-speed transmission, fingertip control and the exclusive Flexor blade. Priced at $154.50.

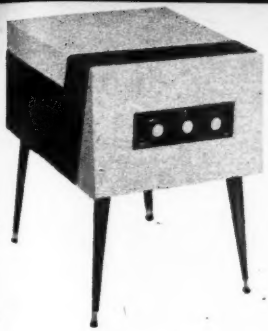


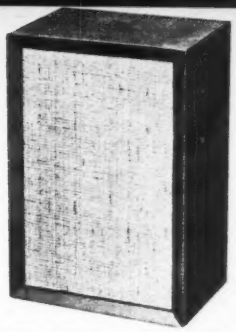
126th-135th PRIZES

AMERICAN TACKLE & EQUIPMENT Co. gives you Ocean City, Montague and True Temper tackle, $119 dream combinations good for spinning, bait and fly fishing.

136th-142nd PRIZES

RAY-O-VAC award of three lanterns, four flashlights with Sportsman and Leak Proof batteries plus a battery-run phono-radio. $117.





90th-97th PRIZES

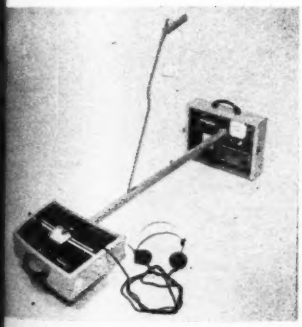
DYNAMIC Quadnaural two-piece chairside hi-fi ensemble has four-speed changer and four speakers, makes music live for you. Prize value $150.

98th-107th PRIZES

PROTO TOOLS—the name means PROfessional TOols—makes up $140 kit of high-quality hand service tools for you. Here is everything required for virtually any job that you may run into. Includes open-end and box wrenches, combinations, sockets, saw, pliers and case.

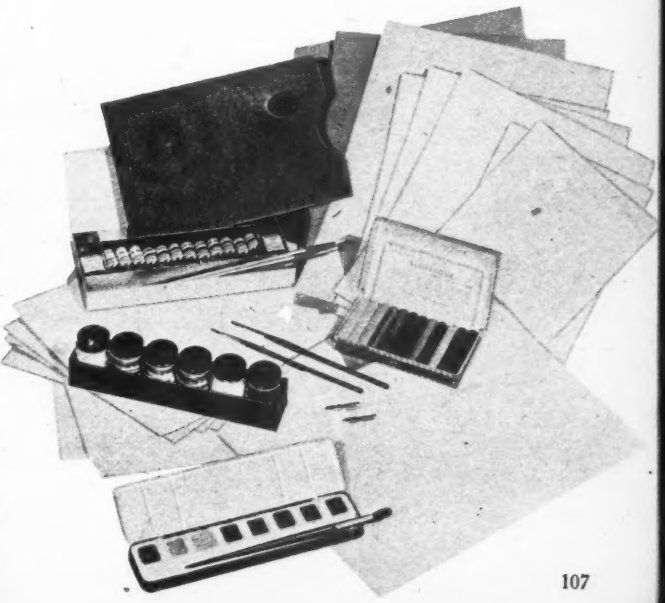
108th-110th PRIZES

DETECTRON's extra sensitive 711 metal detector—$138.50.



111th-125th PRIZES

THE WASHINGTON SCHOOL OF ART provides art training right in your home with easy, clear lessons—$125.



143rd-145th PRIZES

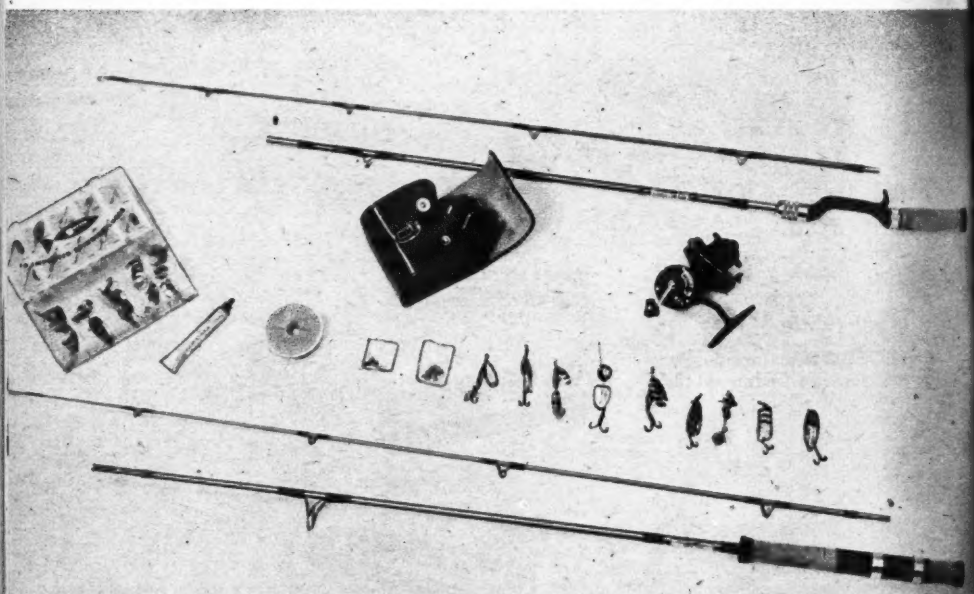
DETECTRON's brand-new buried treasure finder—$110.

146th-170th PRIZES

VIEWLEX Project-O-Matic slide projector gives you ultimate enjoyment of your favorite color slides, is easy to operate. The $90 projector plus $15 in extras—a $105 prize.

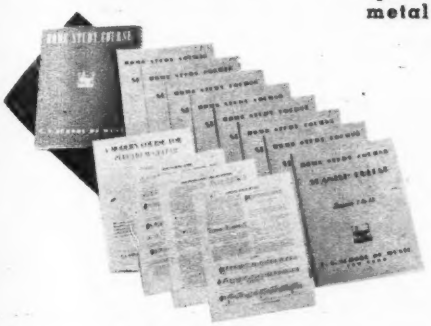
181st-200th PRIZES

GARCIA fishing outfit with Mitchell Cap spinning, Abu-matic spin casting reels; two Garcia Gold Bond rods, lines and lures—all the fisherman needs in a $101.50 outfit.



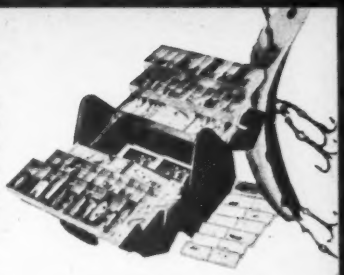
171st-180th PRIZES

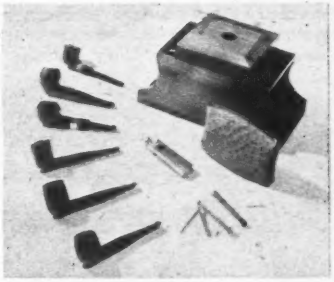
U. S. SCHOOL OF MUSIC home study courses in piano and guitar let you learn music at home without a private teacher and in a short time with simple lessons—$104.



201st-205th PRIZES

HELIN TACKLE Co. lure assortment of over 30 styles, 100 separate lures for every use from flyrod fishing to spinning; with sturdy metal case—$101.35.



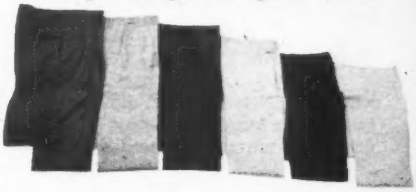


206th-210th PRIZES

ROGERS IMPORTS offers six pipes, caddy rack, pouch, lighter—$101.

211th-220th PRIZES

BEAR archery set of hard-hitting Kodiak laminated glass bow and 6 field, 6 hunter arrows, glove, quiver and armguard—$100.05.



221st-225th PRIZES

BOTANY slacks with Motional Design for comfort, style—a $100 wardrobe.

226th-245th PRIZES

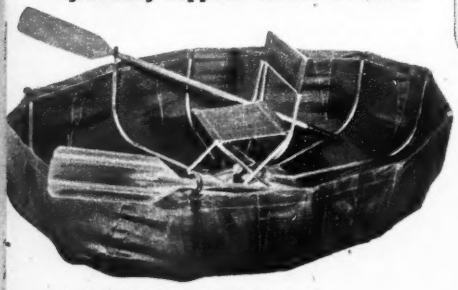
BURKE, first in golf since 1910 and America's oldest exclusive club-maker, presents a set of Autograph clubs. Beginners or experts play well with Burke clubs, so perfectly balanced that they'll give you a clean, sure hit under all conditions—$100.

246th-250th PRIZES

REVERE $100 wardrobe for the active sportsman: sweaters, jackets, shirts. Some designed by Cary Middlecoff.

251st-255th PRIZES

KINGS MEN toiletries to make a man feel like a king every day; a year's grooming supplies valued at $99.95.



316th-320th PRIZES

PORTA Co. of Canton, Mass., presents a Packet Folding Boat weighing only 24 lbs. Ready to use—$98.50 delivered.

256th-280th PRIZES

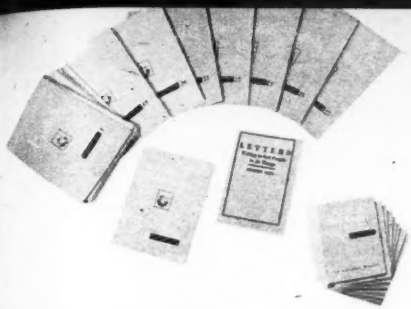
PRECISION RADIATION INSTRUMENT'S famed Lucky Strike geiger counter, sensitive but stands rugged use—a $99.50 value.

321st-330th PRIZES

ZEBCO reel assortment with Feathertouch Control, featuring Model 44 which boasts famed anti-reverse and fast retrieve—$96.40.

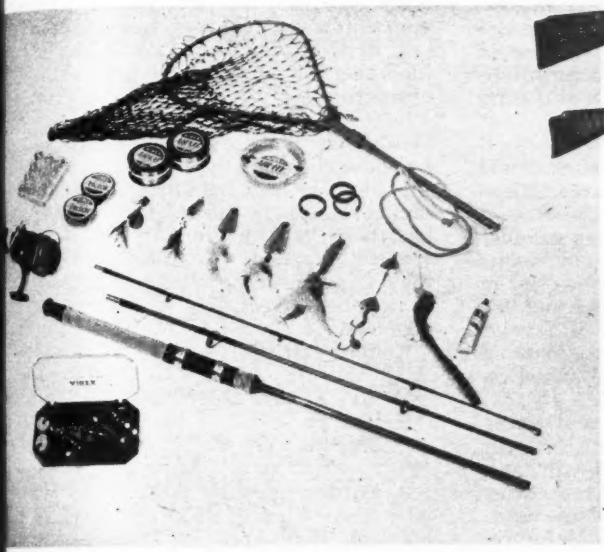
341st-350th PRIZES

GARRARD model RC98, one of the world's finest record changers, plays four speeds auto and manual; pusher platform protects records; has variable control on all speeds—an $89.60 gem.



281st-295th PRIZES

SHERWIN CODY's renowned home course in English enables you to improve your own powers of self-expression. Plus choice of music-study course—$99.50 package.

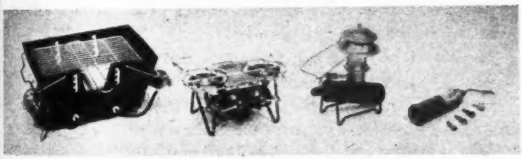


336th-340th PRIZES

MOSSBERG, the name that means accuracy, brings you the Mossberg 200K 3-shot pump 12 ga. multiple-choke shotgun (weighs only 7½ lbs., perfect balance, velvet smooth); the Mossberg 342K .22 carbine, 7-shot, bolt-action, clip-loading, only 5 lbs. light; and Mossberg Covey Hand Trap that throws 1, 2 or 3 standard clay targets, simple to operate, light, portable, strong and it has no moving parts!—a $94.85 value.

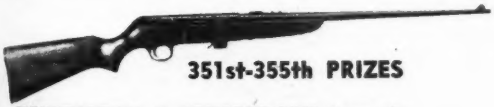
296th-315th PRIZES

AIREX complete spinning kit including a Larchmont reel, Compact Carrier rod, reel, line, lures, net—a $98.90 prize!



331st-335th PRIZES

BERNZ-O-MATIC $95 bottled-energy group of indoor-outdoor grille (produces charcoal flavor), stove, lantern, torch.

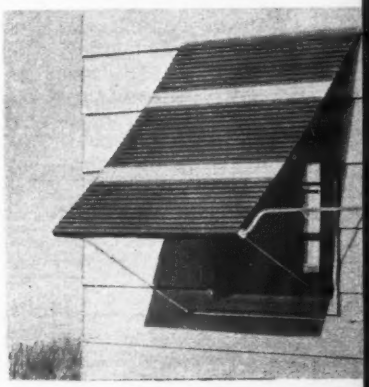


351st-355th PRIZES

HARRINGTON & RICHARDSON hunter's pair of a Lynx semi-automatic .22 rifle (shown), Topper 12-gauge shotgun, cases—dependable, accurate—$89.45.

356th-361st PRIZES

FLEXALUM Roll-Up sun or weather awnings; custom fit any window—$85.



TURN PAGE FOR OFFICIAL RULES AND ENTRY COUPON

The Official Rules for MI's $75,000 Contest

Read All of Them and Obey Them

1. MI's $75,000 CONTEST is a test of your ability to select the most popular of 15 specified articles in each of the January, February and March 1958 issues of MECHANIX ILLUSTRATED.

2. In each of the three contest issues there will be printed a list and description of 15 articles appearing in that issue. You will select what you consider will be the most popular items on that list, each item of which will be identified by a number, title and summary of contents.

3. After studying the list (or, preferably, reading the actual articles) and making your choice, turn to the Official Entry Coupon. Alongside the word FIRST, write the identifying number of the article you believe will be the most popular on the list. Next, select the other articles you believe should be rated SECOND, THIRD, FOURTH and FIFTH in popularity and write their numbers in the corresponding spaces on the coupon.

4. Entries will be judged and prizes awarded by comparing your selections with a national survey which will rank in order of popularity the five articles on each list which readers like best. Judging will be done by O. E. McIntyre, Inc., whose decisions will be final. All entries become the property of Fawcett Publications, Inc., and none will be returned.

5. PRINT your name and address on the coupon. When you have completed all three coupons from the January, February and March issues pin, paperclip or staple them together and mail all three in the same envelope, as described below. Do not mail single coupons. Do not include anything in the envelope except your entry.

6. Winners will be selected on the basis of entries which make the most accurate choices of popular articles in all three lists. (EXAMPLE: If several entries have correctly chosen the most popular articles in each of the three lists, judges will proceed to SECOND choice selections. If ties still remain, judges will proceed to THIRD choices, etc., until all winners are selected.) In case of ties, entries postmarked earliest will win. (So complete your entry and mail it early!)

7. PRINT your name and address in the upper left corner of the front of the envelope. Just beneath this, PRINT in sequence, separated by hyphens, the identifying numbers of the three articles you have chosen as most popular. Print the January number first, February number second and March number last, being sure to separate the numbers with hyphens (EXAMPLE: 66-72-81). Drawing at the bottom of this page shows the correct way to address the envelope.

8. Mail entry to:

MI's $75,000 CONTEST
Box 20
Westbury, N. Y.

9. Entries must be postmarked not later than April 1, 1958 and received not later than April 10, 1958.

10. It is not necessary to buy MECHANIX ILLUSTRATED to enter. Free entry blanks and rules may be obtained from newsstands during the final month of the contest. Accurate hand-drawn copies of Official Entry Coupons will be accepted.

11. Only one entry per person. This contest is open to any resident of the Continental United States or Canada except employees of Fawcett Publications, Inc., its wholesale distributors and advertising agencies and their employees and families.

12. Winners will be notified by mail and their names published in the August 1958 MECHANIX ILLUSTRATED. •

Print your name and address here. → JOHN J. DOE
111 MAIN STREET
CENTERTOWN 13, ILL.

Put numbers of articles you have chosen as most popular here. → 66-72-81

MI's $75,000 CONTEST
BOX 20
WESTBURY, N.Y.

CORRECTLY addressed envelope for an entry appears at left in small scale. Be sure to print your name and address on your envelope.

Article Summaries And Official Entry Coupon

ARTICLE LIST NO. 3
Summaries of articles from March 1958 MI

Select the five articles you believe will be most popular from the list below and write the identifying numbers in proper blanks on Coupon No. 3. See rules for full details.

1. **Let's Cure The Scientist Shortage—Now!** A congressman proposes we build a U. S. Science Academy.
2. **Laboratory In Outer Space.** An artist's concept of a satellite equipped as a celestial observatory.
3. **Woodchucks Can Fool You.** The favorite quarry of small-bore riflemen is a wily varmint, hard to shoot.
4. **He Raises The World's Toughest Birds.** How an ingenious swan-breeder turned his hobby into a business.
5. **Plane Lands At 5 MPH!** Unique craft with channels in its wings may be tomorrow's safe airplane for everybody.
6. **McCahill Tests The '58 Chryslers.** Car expert's report on the new models of a famous line of automobiles.
7. **McCahill's Tips On Touring.** Ways to make your motor trip more comfortable and enjoyable.
8. **All About Job Tests.** What to expect in capability exams many companies now give to job-hunters.
9. **Down The Drain.** Kitchen garbage disposal units, how they work and how to install them.
10. **Utility Lathe Bench.** Plans for building a power-tool support that doubles as a storage cabinet.
11. **Tungsten Carbide.** This new grit is hard and long-lasting, may replace sandpaper and other abrasives.
12. **Miniature Stanley Steamer.** Instructions for making a model of the famous early-day automobile.
13. **Drop Leaf End Table.** How to produce a beautiful Early American piece in your home workshop.
14. **The Screwdriver.** Information for craftsmen about screws and the variety of tools for driving them.
15. **All About Spark Plugs.** Expert advice on a vital automotive part and how to service it in today's cars.

NOTE: Entry Coupons No. 1 and 2 and the matching lists of article summaries appear on page 163. This issue contains everything you need to enter!

LAST CHANCE TO ENTER!

THE TIME to enter MI's $75,000 Contest is now! This issue contains everything you need to complete your entry, which must be postmarked not later than April 1. So fill out the coupons and mail them in today! On this page appears Official Entry Coupon No. 3—the last of the three contest coupons. On page 163 are reprinted Official Entry Coupons No. 1 and No. 2 and their matching article lists. When completing your entry don't forget to print your name and address on each coupon and to print, *on the outside of your envelope*, the numbers of the three articles you have chosen as most popular. Remember: in case of ties, entries postmarked earliest will win. Mail yours now!

OFFICIAL ENTRY COUPON

NO. 3 MARCH 1958 ISSUE

FIRST.....

SECOND.....

THIRD.....

FOURTH.....

FIFTH.....

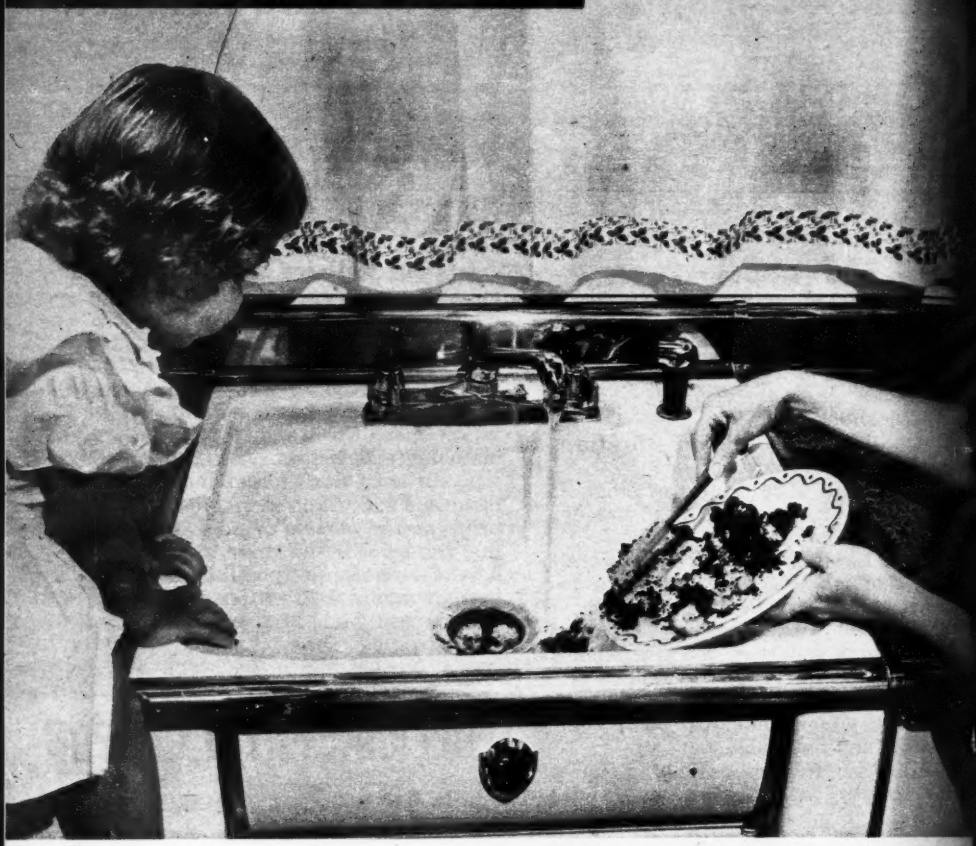
In the blanks above write the identifying numbers of the articles you have chosen as the most popular in Article List No. 3 (March 1958 issue—the list appears at left). Print name and address in spaces below.

NAME.....

ADDRESS.....

CITY.....STATE.....

Clip this coupon along broken line; when you have filled in all three coupons pin, paper-clip or staple them together before mailing them in.



DOWN THE DRAIN

By Lyman Gaylord

Meet one of today's most popular and practical home appliances—the garbage disposal unit.

GETTING rid of garbage is at best a nasty job. It's no fun stumbling outdoors every night clutching those wet paper bags and soggy bundles that must be crammed into a garbage pail already full to overflowing.

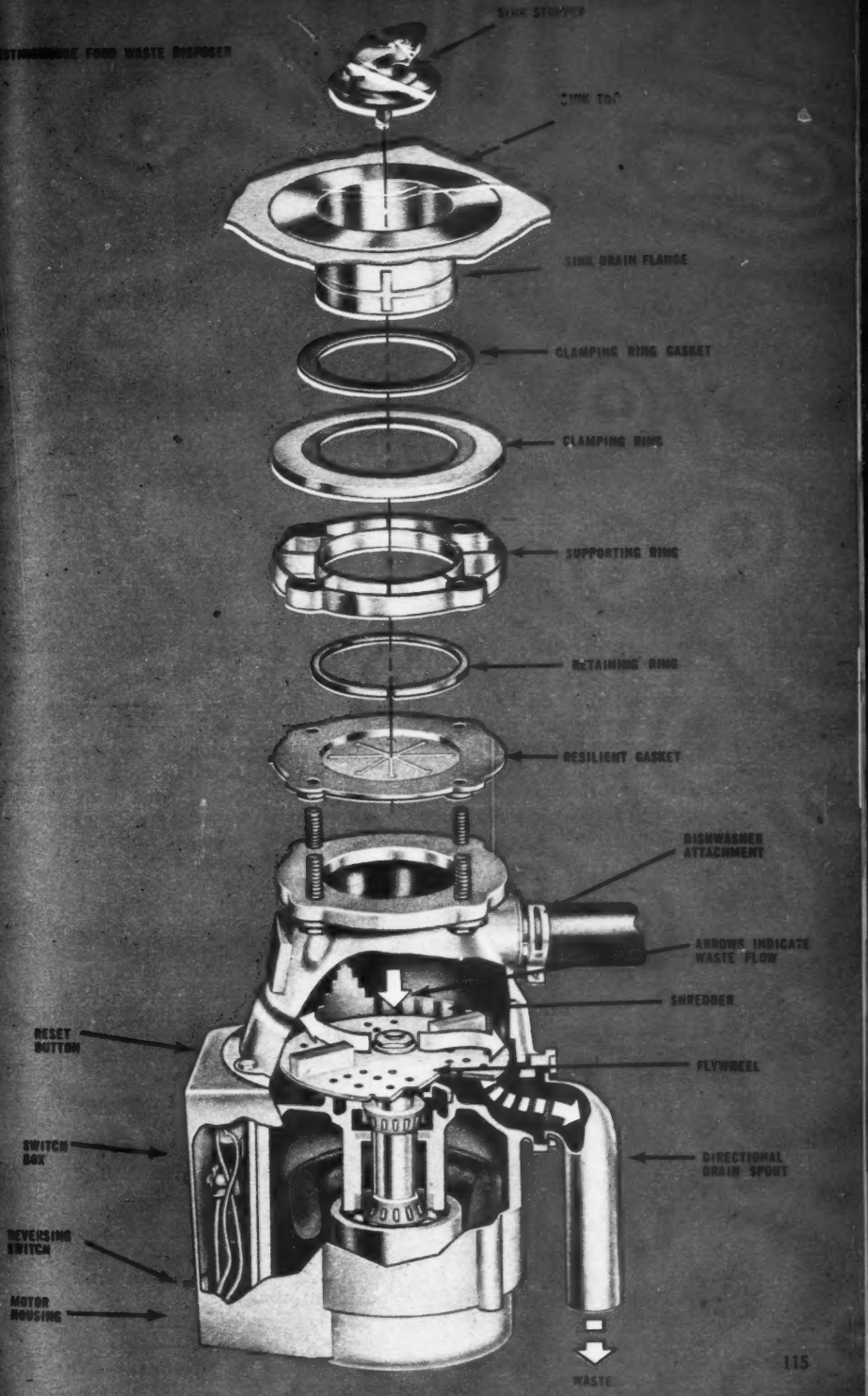
There is, of course, a modern and efficient way of eliminating this problem. Tucked neatly out of sight under more than 3,000,000 kitchen sinks are garbage disposal units that daily go about their business of shredding garbage into oblivion.

"Well," you may ask, "What *about* garbage disposers? What do they do and how do they do it? Should I buy one? What about installation and local plumbing codes? How about service?"

What They Do

All right, let's try and answer these questions.

WESTINGHOUSE FOOD WASTE DISPOSER



CUTTER SYSTEM of the Youngstown Kitchen disposers features stainless steel teeth which are sharp on both sides and can be reversed to provide double the normal length of service.

Today's disposal units do a rapid and complete shredding job, are much more silent than earlier models and are easier to install. Disposers by Kelvinator, American Kitchens, and Philco, as well as those pictured in this article, are all fine examples of this modern-day appliance.

Remember, however, that all disposers are built to handle garbage—that is, food wastes—only. Statistics show that each of us manage to produce some two to three pounds of trash per day plus about one-half to one pound of garbage. A disposer will accept practically all garbage including bones, fruit pits, rinds, lobster and shrimp and crab shells, egg shells, vegetable parings, fibrous pods, fats, grease and coffee grounds. But bottles, bottle tops, tin cans, paper bags, newspapers and assorted "trash" will still remain to be disposed of by other means.

How They Do It

Mechanically a garbage disposer is simplicity itself. Its lower section consists of a ¼- or ⅓-horsepower electric motor; the top portion couples to the drain opening in the kitchen sink. All the cutting action takes place in the disposer's midsection or shredding chamber. Here a rotating impeller and stationary shredding ring, both made of super-hard steel and equipped with several cutting edges, alternately tear, cut, shred and pulverize garbage waste as it is fed in through the opening at the top.

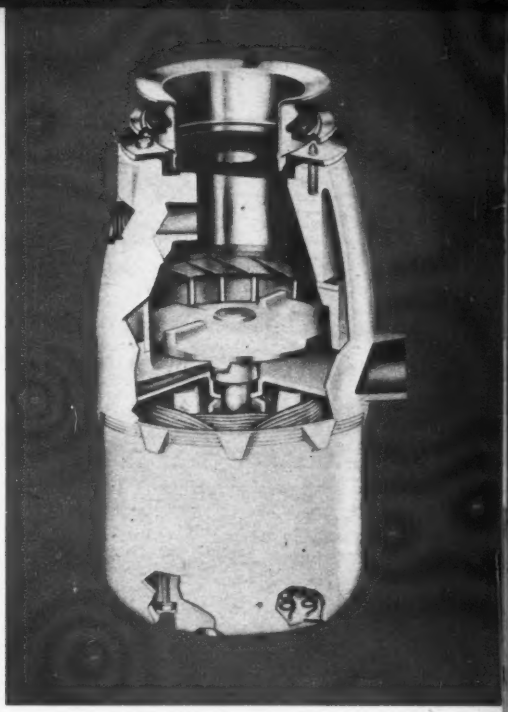
A stream of cold water is flushed through the disposer while the machine is at work. The water washes the finely shredded waste out of the mechanism and into the sink's drain pipe where it is ultimately carried into either the local sewers or a septic tank.

It is important that *cold* water be used because warm or hot water—since it dissolves grease and fats—will deposit them on the sides of the disposer and in the drain pipes. Cold water turns grease into solid globules that can be washed down the drain and out into the sewer.

The Two Types

A disposer is fed by one of two methods: either in individual batches or continuously.

In the batch method, the shredding

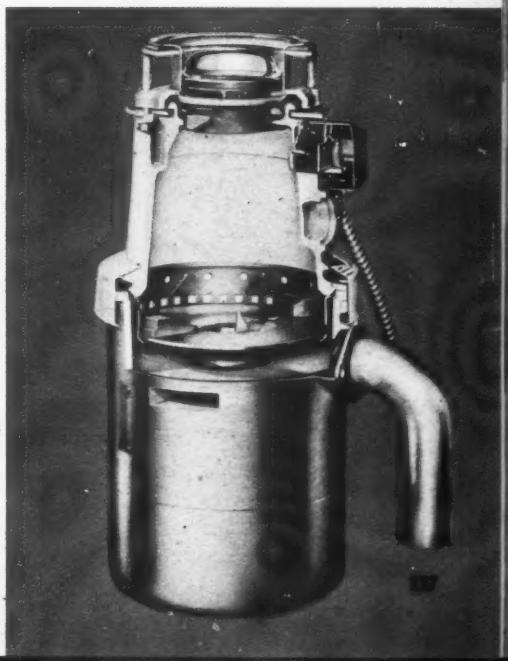


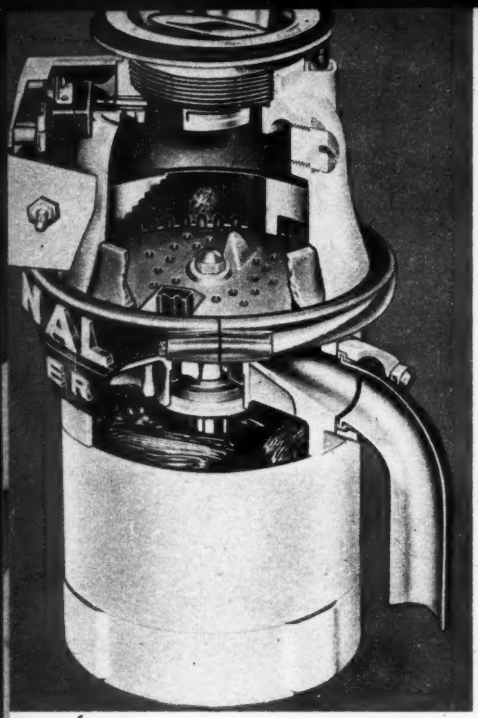
ANTI-JAM impellers, built-in dishwasher connection recommend this Frigidaire unit.

WIDE THROAT of the Pioneer D-57 makes for easy loading of large garbage scraps.

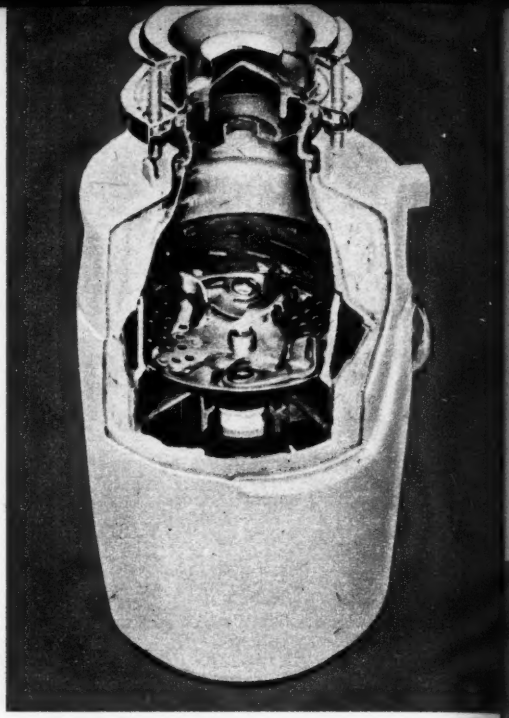
IN-SINK-ERATORS come in six decorator colors, have automatic reversing action.

GENERAL ELECTRIC'S Disposals boast a "super grinding" action, easy installation.



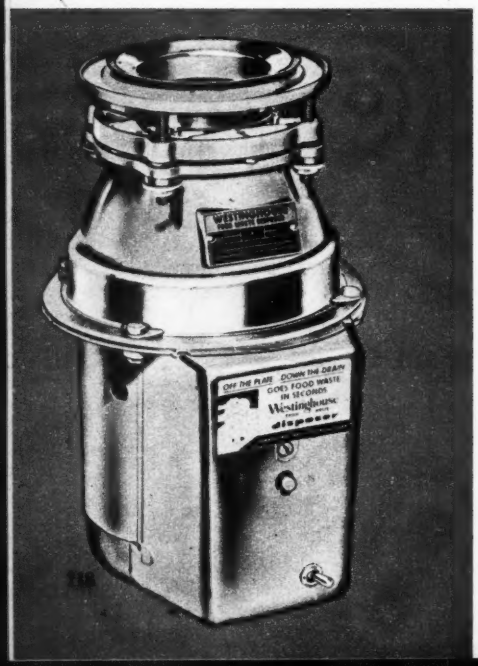


NATIONAL'S exclusive "whisper ring" isolates sound, vibration from the sink.



WASTE KING disposer uses Silicon fiber to muffle noise, is quiet and efficient.

SOME WESTINGHOUSE units feature two sets of shredders—primary and secondary.



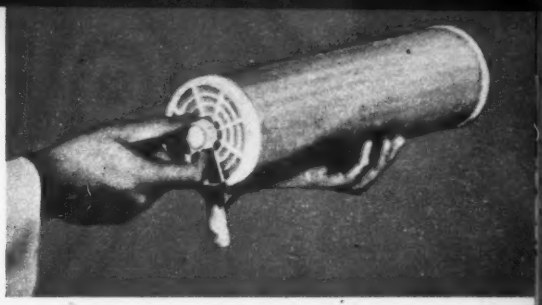
chamber is stuffed with garbage, the water turned on and the disposer motor started. When one load is taken care of the process is repeated.

With the continuous-feed method, the water is left on and the motor runs continuously. Waste is fed into the disposer's maw as fast as it accumulates. These models are controlled by electric switches mounted in the kitchen wall, or on the counter top.

Batch-loading models are controlled by a combination drain plug and switch. To operate one of these you must first remove the plug from the drain opening. The disposer is then loaded and the plug replaced and turned to the indicated "on" position. While this method involves waste motions not encountered with the continuous-feed models there is somewhat less danger of dropping a bottle cap or piece of silverware into a batch-fed disposer.

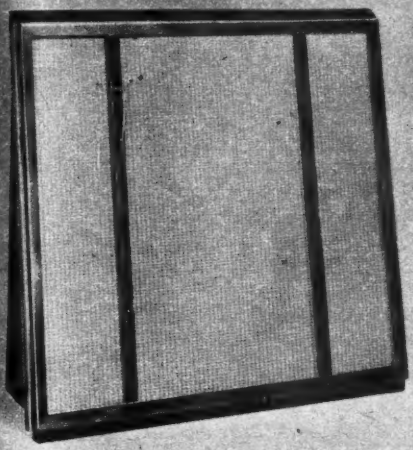
In the last analysis your choice between the two types will be on the basis of personal [*Continued on page* 158]

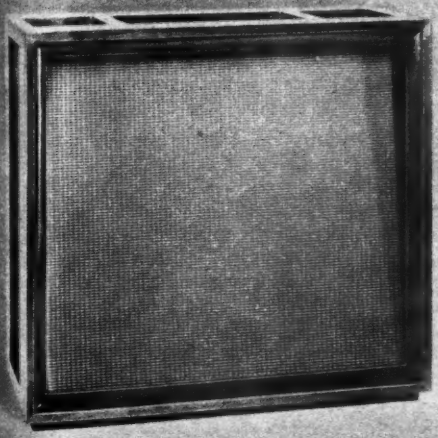
WHAT'S NEW

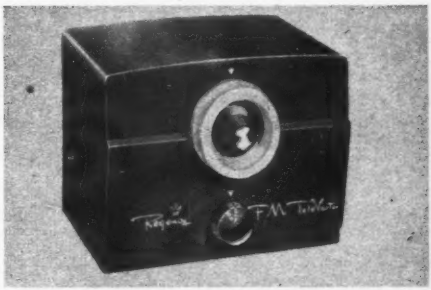


BI-STEREO external speaker fits any electronic sound system; has 20 watt output, 5 ohms impedance, and reaches 15,000 cps.
Videola-Erie Corp., 75 Front, Brooklyn, N. Y.

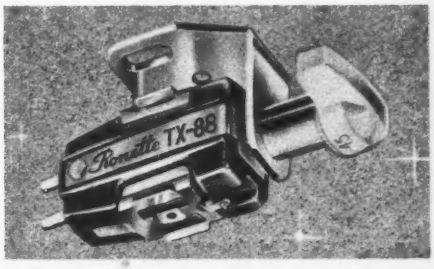
THREE-WAY speaker system is available in two styles. Both measure 34"x31"x12".
British Industries, Dept. K31, Port Washington, N. Y.





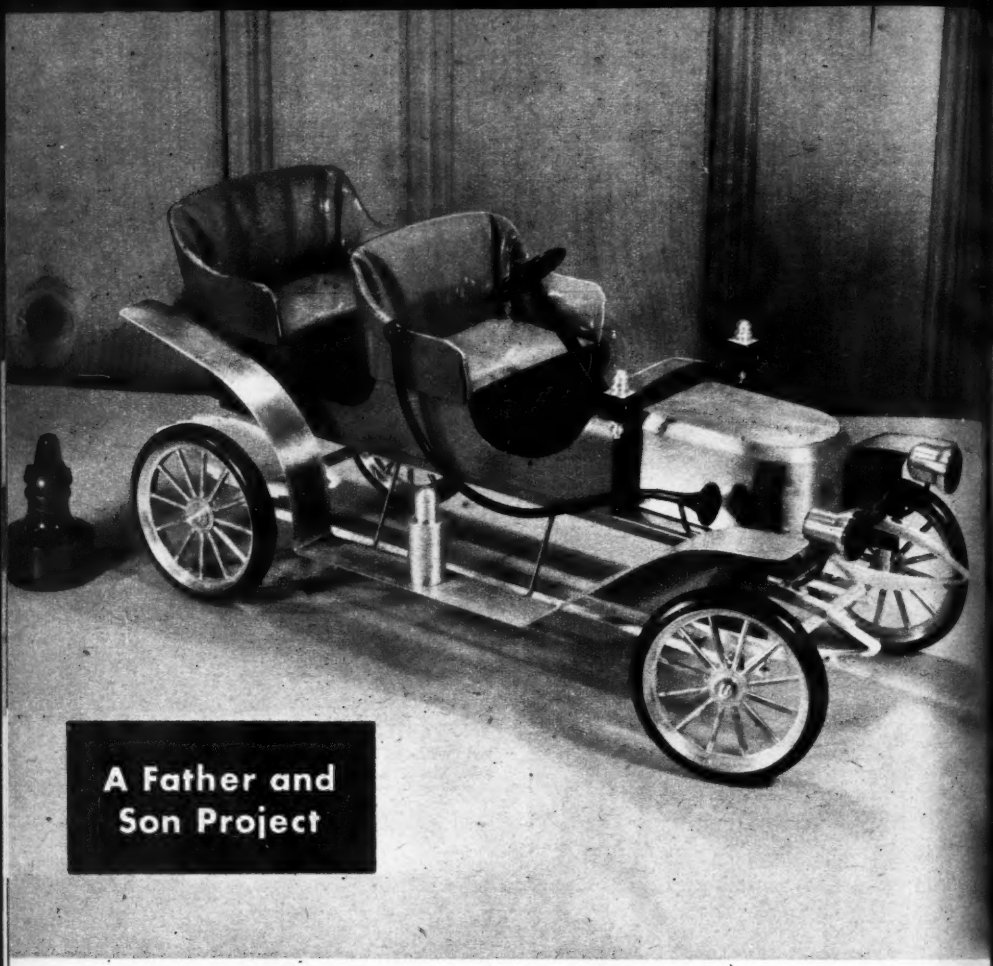


TELEVERTER gives FM reception through TV set without affecting normal TV reception.
Scope, 5138 S. Vermont, Los Angeles 37, Calif.



TWIST CARTRIDGE speeds styli changes. Flat response from 30 cps.-24 kc., 4 V output.
Ronette Acoustical Co., 190 Earle Ave., Lynbrook, L. I., N. Y.

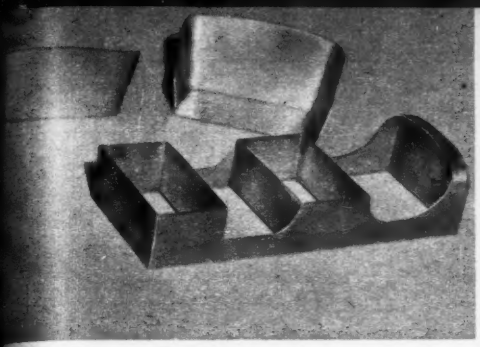
LOW PRINT magnetic tape for perfectionists practically eliminates print-through.
Minnesota Mining & Mfg. Co., St. Paul 6, Minn.



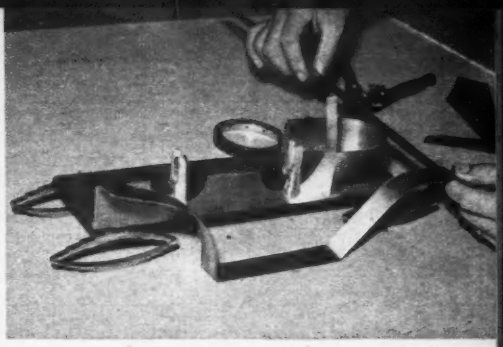
MINIATURE STANLEY STEAMER

SAY "steam car" to most people and the word Stanley immediately comes to mind. However, in justice to other manufacturers of these most unusual cars it is only fair to point out that there were in production at one time or another more than 80 separate makes of steam cars throughout the world! The Stanley Steamer had the best record of them all.

This famous car was originally built by two brothers, Freeland O. and Francis E. Stanley. They were pretty good inventors in other fields. They produced the first commercially manufactured violin in the United States, a generator for illuminating gas and the famous Stanley dry plate which they later sold to Eastman Kodak. They hit upon the idea of making a steam car



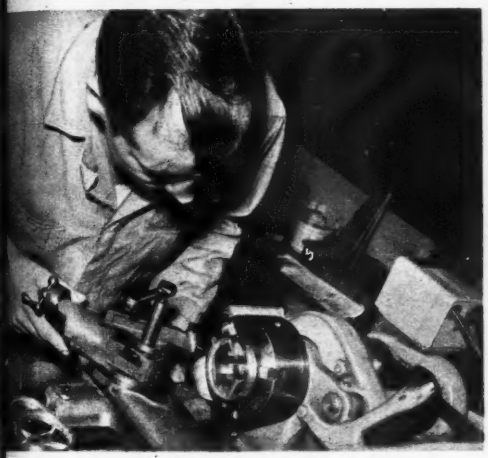
THE BODY is 1/32-inch sheet brass. Cowl flaps are soldered at center of firewall.

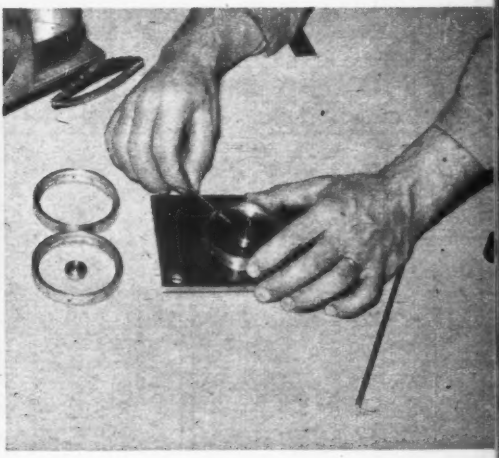


SMALL CLAMPS hold side to floor box for a preliminary fitting with adjacent parts.

WHEEL RIMS are shaped from brass disks 3½ inches in diameter and 9/16 inch thick.

HOLES in rims are drilled same diameter as spokes (⅛ inch) so fit will be tight.

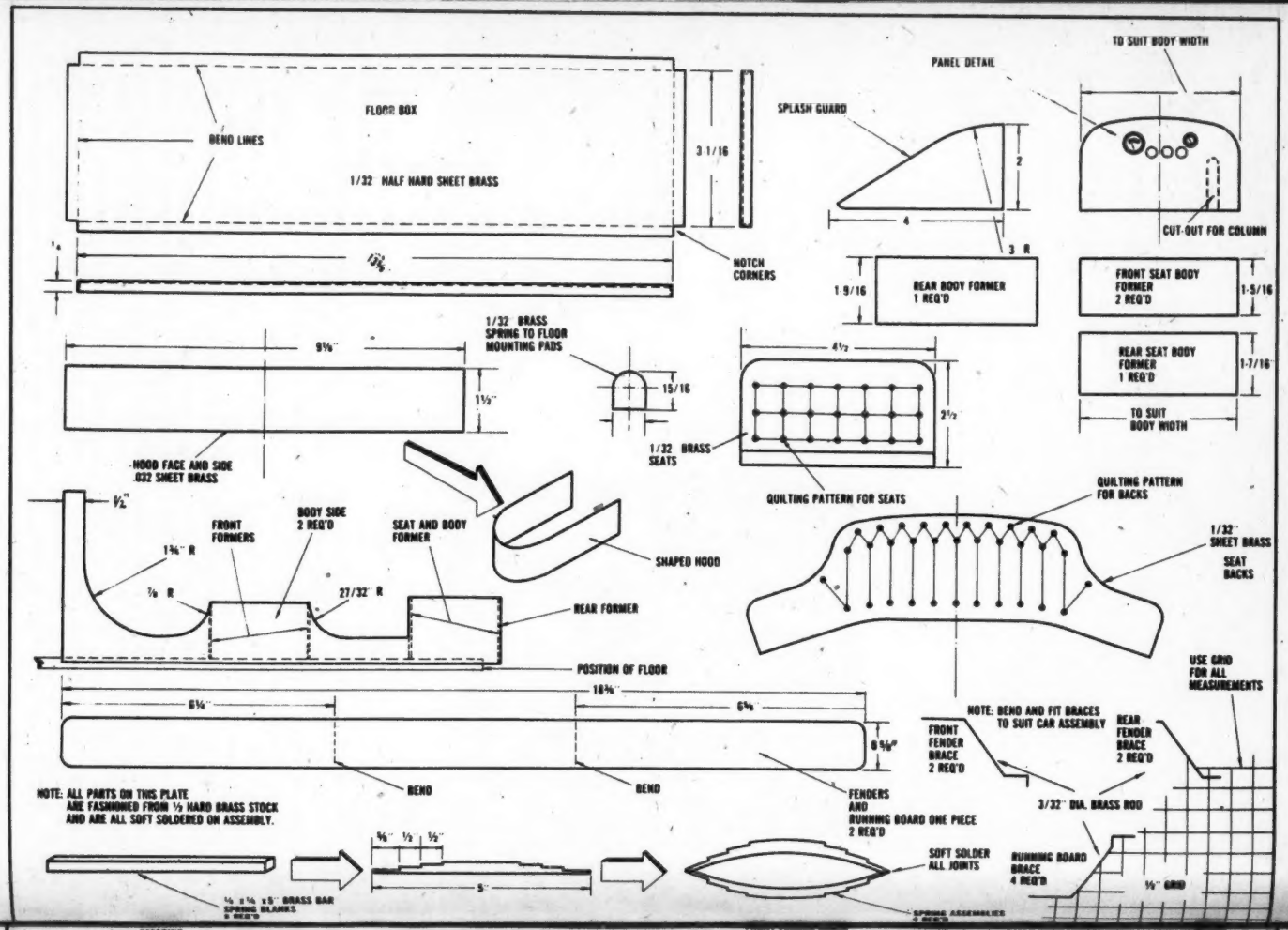


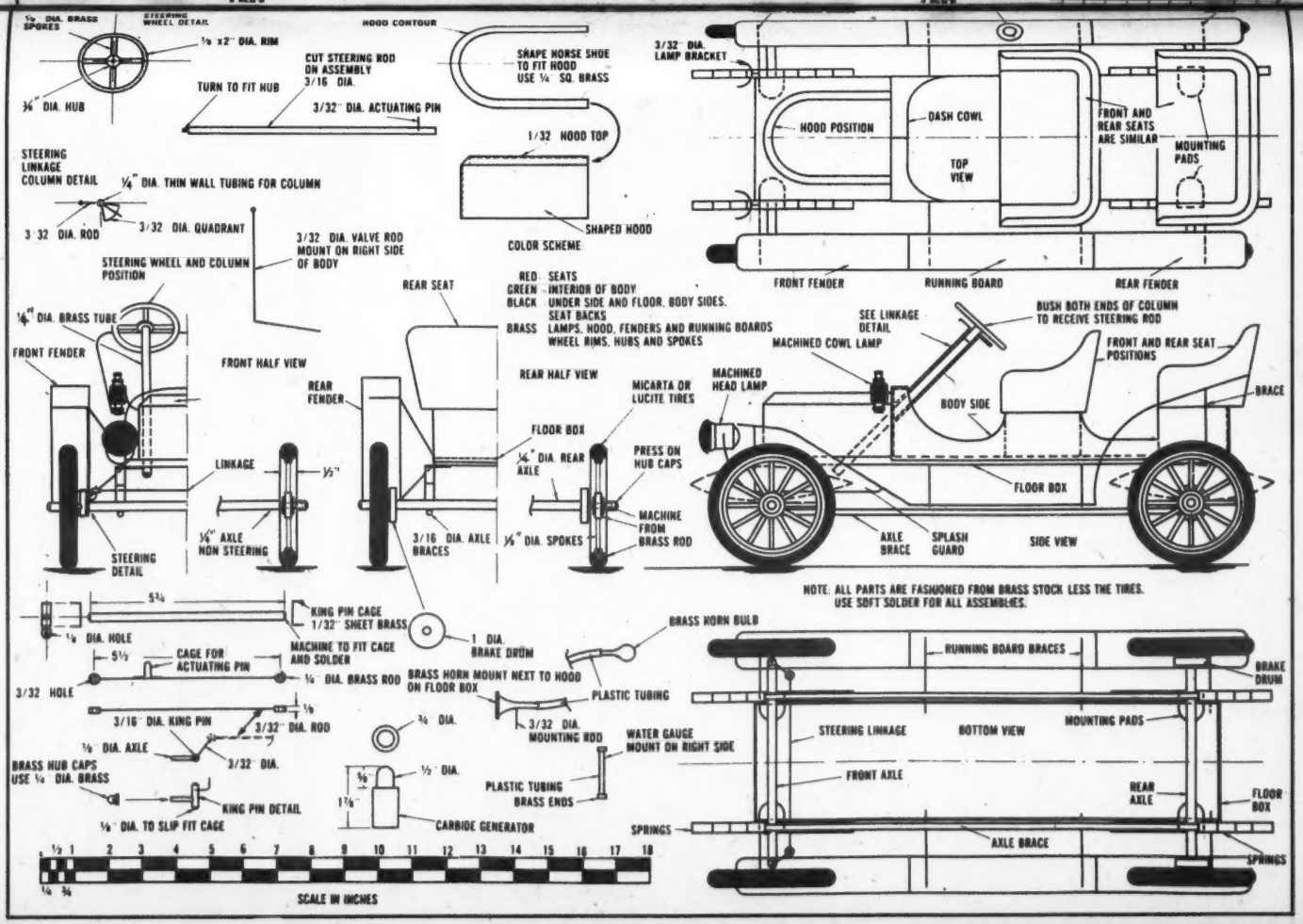


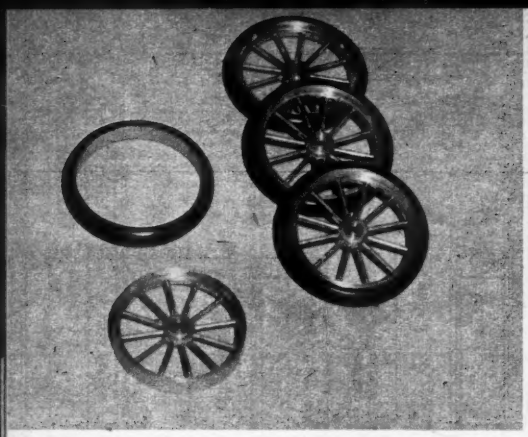
when they saw a "horseless" carriage at a fair in 1896. The first Stanley Steamer was completed sometime in October 1897. It proved to be an immediate success and they soon found themselves in the steam car business.

The legends about these fabulous steam cars are almost legion. Stories are told that no one ever was able to hold the throttle wide open on a Stanley —so great was their power; that they could climb up a 50 per cent grade; that it was impossible to have a boiler explosion on a Stanley. Whatever the stories were, one single fact remains. It was a fabulous, remarkable car. It was foolproof and good-looking. It had no clutch, gearshift, flywheel, carburetor, magneto, spark plugs, distributor, self-starter or any of the other myriad devices which go to make up a modern automobile. It didn't even have power-operated windows!

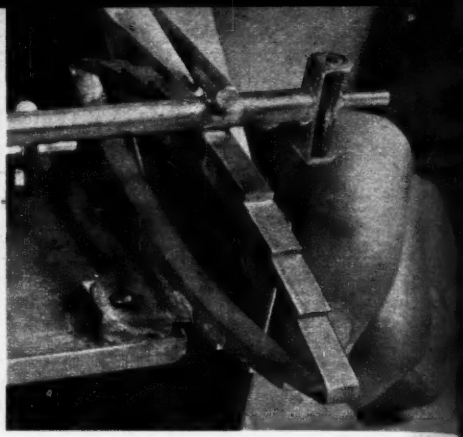
The Stanley steam car could out-accelerate all gasoline-powered cars of its day. Yet, despite all its virtues, the car was pushed out of the market by the gasoline-breathing juggernaut. It staggered along until 1924 when it went into receivership. It had a slight revival and finally died in 1925. It had a glorious past and we invite you to build this authentic model of a famous car. The only power tools you will need are a drill press and a lathe with milling attachment. For the sheet metal work you


FLOOR BOX
BEND LINES
1/32 HALF HARD SHEET BRASS
3 1/16
NOTCH CORNERS
PANEL DETAIL
TO SUIT BODY WIDTH
SPLASH GUARD
2
4
3 R
CUT-OUT FOR COLUMN
1-9/16
REAR BODY FORMER 1 REQ'D
FRONT SEAT BODY FORMER 2 REQ'D
1-5/16
REAR SEAT BODY FORMER 1 REQ'D
1-7/16
TO SUIT BODY WIDTH
1/32 BRASS SPRING TO FLOOR MOUNTING PADS
15/16
1/32 BRASS SEATS
QUILTING PATTERN FOR SEATS
HOOD FACE AND SIDE .032 SHEET BRASS
SHAPED HOOD
FRONT FORMERS
BODY SIDE 2 REQ'D
SEAT AND BODY FORMER
27/32" R
REAR FORMER
POSITION OF FLOOR
QUILTING PATTERN FOR BACKS
1/32" SHEET BRASS
SEAT BACKS
USE GRID FOR ALL MEASUREMENTS
NOTE: BEND AND FIT BRACES TO SUIT CAR ASSEMBLY
FRONT FENDER BRACE 2 REQ'D
REAR FENDER BRACE 2 REQ'D
3/32" DIA. BRASS ROD
BEND
BEND
FENDERS AND RUNNING BOARD ONE PIECE 2 REQ'D
NOTE: ALL PARTS ON THIS PLATE ARE FASHIONED FROM ½ HARD BRASS STOCK AND ARE ALL SOFT SOLDERED ON ASSEMBLY.
SOFT SOLDER ALL JOINTS
RUNNING BOARD BRACE 4 REQ'D
½" GRID
STEERING WHEEL DETAIL
HOOD CONTOUR
CUT STEERING ROD
SHAPE HORSE SHOE
3/32" DIA. LAMP BRACKET


1/8 DIA. BRASS SPOKES
STEERING WHEEL DETAIL
1/8 x 2" DIA. RIM
3/8" DIA. HUB
TURN TO FIT HUB
CUT STEERING ROD ON ASSEMBLY 3/16" DIA.
3/32" DIA. ACTUATING PIN
HOOD CONTOUR
SHAPE HORSE SHOE TO FIT HOOD USE 1/4" SQ. BRASS
1/32" HOOD TOP
SHAPED HOOD
3/32" DIA. LAMP BRACKET
HOOD POSITION
DASH COWL
TOP VIEW
FRONT AND REAR SEATS ARE SIMILAR
MOUNTING PADS
FRONT FENDER
RUNNING BOARD
REAR FENDER
STEERING LINKAGE COLUMN DETAIL
1/4" DIA. THIN WALL TUBING FOR COLUMN
3/32" DIA. ROD
3/32" DIA. QUADRANT
3/32" DIA. VALVE ROD MOUNT ON RIGHT SIDE OF BODY
STEERING WHEEL AND COLUMN POSITION
COLOR SCHEME
RED - SEATS
GREEN - INTERIOR OF BODY
BLACK - UNDER SIDE AND FLOOR, BODY SIDES, SEAT BACKS
BRASS - LAMPS, HOOD, FENDERS AND RUNNING BOARDS WHEEL RIMS, HUBS AND SPOKES
REAR SEAT
1/4" DIA. BRASS TUBE
FRONT FENDER
FRONT HALF VIEW
REAR HALF VIEW
REAR FENDER
FLOOR BOX
1/4" DIA. REAR AXLE
MICARTA OR LUCITE TIRES
PRESS ON HUB CAPS
LINKAGE
1/2"
1/4" AXLE NON STEERING
3/16" DIA. AXLE BRACES
1/8" DIA. SPOKES
MACHINE FROM BRASS ROD
STEERING DETAIL
SEE LINKAGE DETAIL
BUSH BOTH ENDS OF COLUMN TO RECEIVE STEERING ROD
MACHINED COWL LAMP
FRONT AND REAR SEAT POSITIONS
MACHINED HEAD LAMP
BODY SIDE
BRACE
FLOOR BOX
AXLE BRACE
SPLASH GUARD
SIDE VIEW
NOTE: ALL PARTS ARE FASHIONED FROM BRASS STOCK LESS THE TIRES. USE SOFT SOLDER FOR ALL ASSEMBLIES.
5 3/4
KING PIN CAGE 1/32" SHEET BRASS
1/8 DIA. HOLE
MACHINE TO FIT CAGE AND SOLDER
1 DIA. BRAKE DRUM
BRASS HORN BULB
5 1/2
CAGE FOR ACTUATING PIN
1/4 DIA. BRASS ROD
3/32 HOLE
BRASS HORN MOUNT NEXT TO HOOD ON FLOOR BOX
PLASTIC TUBING
3/16" DIA. KING PIN
3/32" DIA. ROD
1/8
3/4 DIA.
3/32" DIA. MOUNTING ROD
1/8" DIA. AXLE
3/32" DIA.
WATER GAUGE MOUNT ON RIGHT SIDE
BRASS HUB CAPS USE 1/4" DIA. BRASS
1/2" DIA.
5/8"
1 7/8"
PLASTIC TUBING BRASS ENDS
KING PIN DETAIL
1/8" DIA. TO SLIP FIT CAGE
CARBIDE GENERATOR
RUNNING BOARD BRACES
BRAKE DRUM
MOUNTING PADS
STEERING LINKAGE
BOTTOM VIEW
FRONT AXLE
REAR AXLE
FLOOR BOX
SPRINGS
AXLE BRACE
SPRINGS
1/2 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
1/4 3/4
SCALE IN INCHES



TIRES turned from Micarta or Lucite are painted black, press-fitted on flat rims.



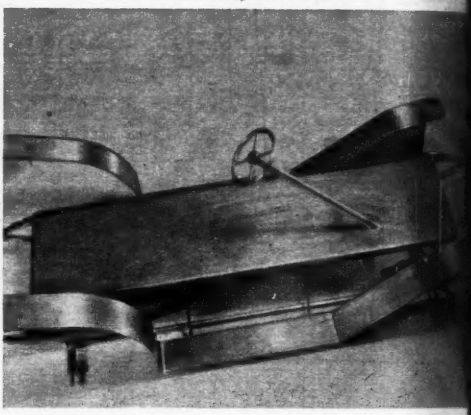
REINFORCING BAR is soldered to bottom of axle; note kingpin cage at the right.

will need shears, drills, files, hammer and a center punch.

All the components can be joined with soft solder and a propane torch. With the necessary tools in front of us, let's proceed. All the metal used is half-hard brass sheet, rod and bar. For the sheet metal components, 1/32-inch sheet is used, the rest is called out in the drawings.

First, start with the springs. A bar of quarter-inch square stock is milled in the lathe to simulate the leafs of the spring—eight are required. Shape them to fit the contour on the plans, then solder to form the four spring assemblies. The next step is the construction of four mounting pads.

The floor box will require some time and careful planning since the entire car is fastened to this member. A quarter-inch flange is bent up on all four edges as [*Continued on page* 160]

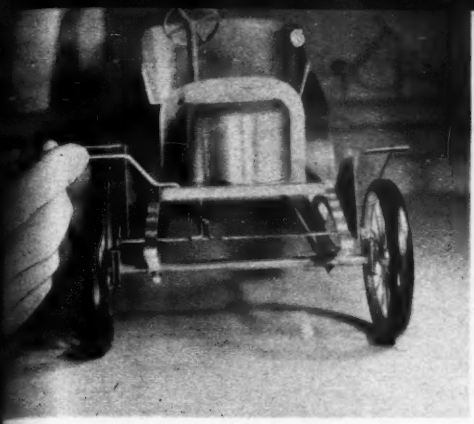


STEERING COLUMN is ¼-inch tube bushed at both ends to receive a 3/16-inch rod.

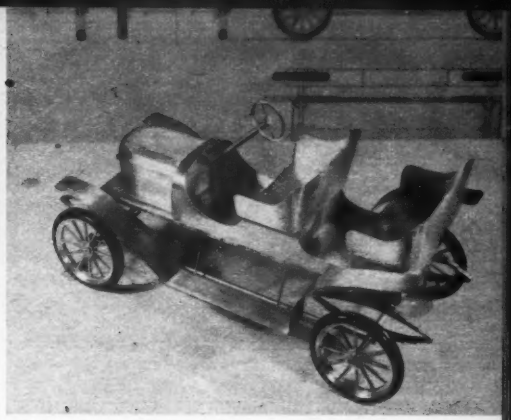
FULL-SCALE PLANS

will greatly simplify construction. Send 50 cents to Mechanix Illustrated Plans Service, Fawcett Bldg., Greenwich, Conn. Please specify Plan Number M-247, Miniature Stanley Steamer.

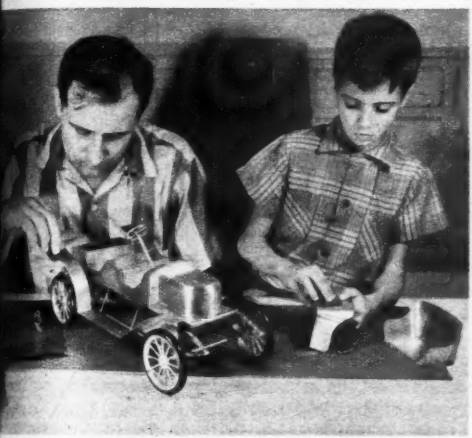
WHEELS are installed to complete the underside; pressed on hub caps retain them.



STEERING LINKAGE is shown above; proper fitting will give 40-inch turning radius.



METALWORK COMPLETED, car awaits final touches. Note the cutout in the firewall.

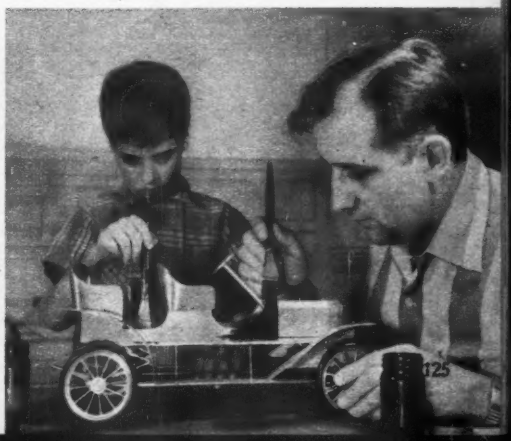


EMERY CLOTH is used to remove any nicks and bring brass to gleaming polish.

CELLULOSE CEMENT holds seat padding in place. Threads create the pillow effect.

UPHOLSTERY consists of cardboard backing, cotton and thin oilcloth or plastic.

GREEN AND BLACK paint is applied as indicated on drawing; the upholstery is red.



THE SCREW DRIVER

This is the third of a series of articles on hand tools.

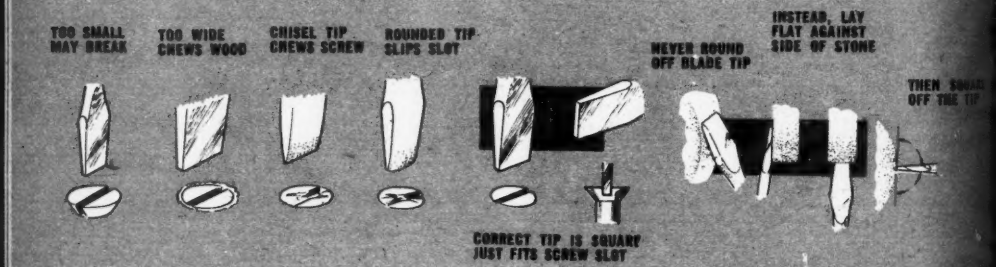
NEXT to the hammer, the screw driver is probably the most widely used tool in the world.

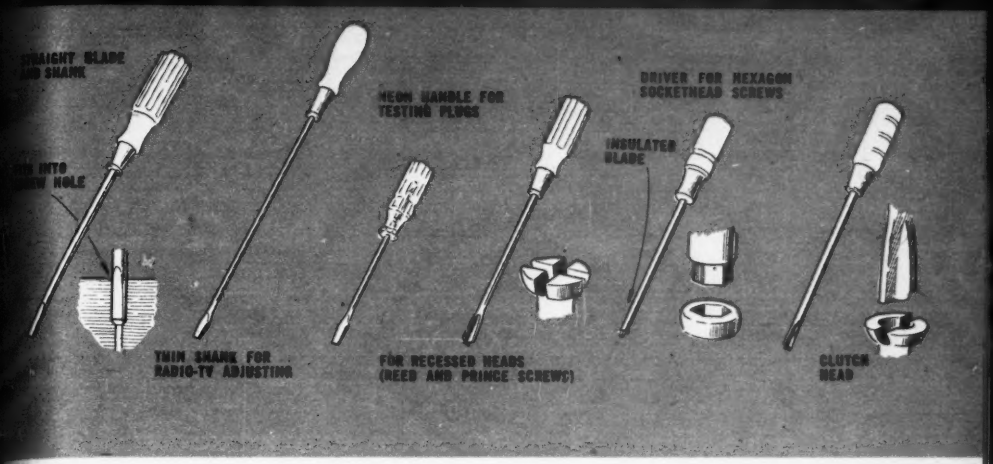
Simple as these tools are, there's a lot to know about them: the dozens of sizes and shapes; the special types designed to serve every purpose and meet any condition; and the mechanical screw drivers that speed work and save labor.

There are the common, clutch head, Phillips and socket head screw drivers, with wood or plastic or hard rubber handles. Some have long, thin and round blades, others have heavy square shanks; and the baby screw drivers—short and stubby. There are offset, instrument, jeweler's, optician's, electrician's and radio types. For greater leverage you can use a screw driver bit in a brace, and for speed there are the spiral-ratchet drivers.

There's even a "screwdriver" to turn the heads of the nightclub crowd—that's the name given to that concoction of orange juice liberally spiked with vodka. It's reported that some users of that "screw driver" often turn up real tight.

In all screw drivers—excepting the latter—the driving force that turns the screws is technically known as torque, or twist, that is supplemented





by the leverage of your arm from elbow to hand. This entire force is transmitted through the screw driver tip seated in the tiny screw slot.

Two things then are obvious: the screw driver tip must fit as snugly as possible in the slot to prevent slipping and the width of the tip should be at least as wide as the diameter of the screw head to give it the largest possible point of contact in the screw slot.

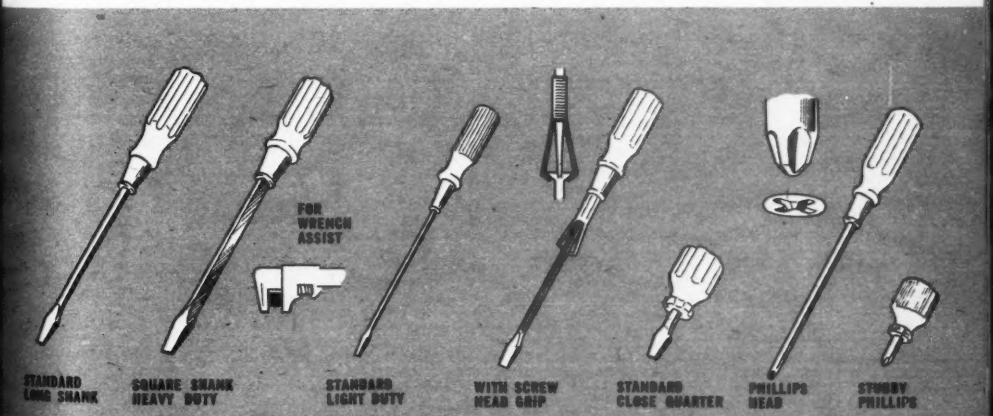
If the screw driver tip is too thin, or the blade too narrow, the slot becomes burred and "chewed" and the screw will be difficult to turn out later because the damaged slot will not offer a firm grip.

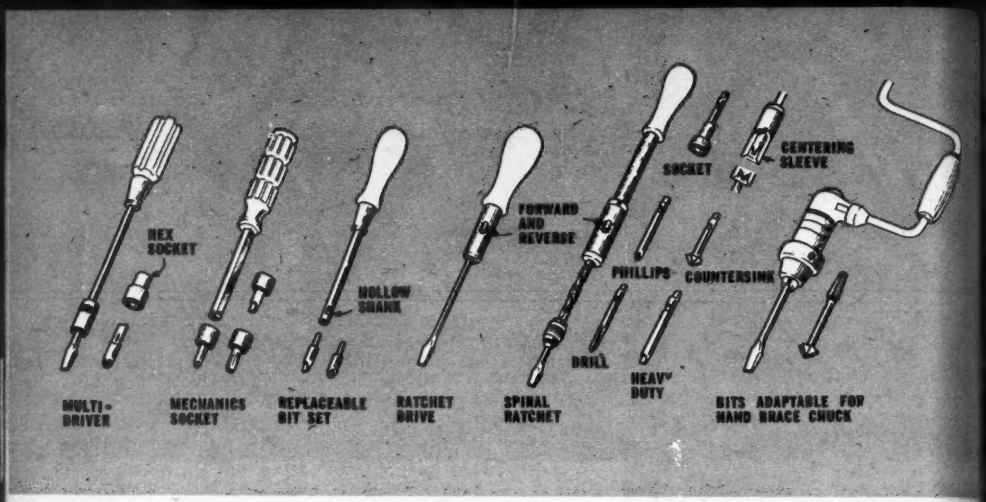
Conversely, it's just as bad to use a screw driver with too large a tip for the screw, as the tip will not seat all the way into the slot, particularly on roundhead screws. The effect will be to spread and twist the slot at the top so that no other size tip can be substituted.

Another basic rule: always use a screw driver with the largest handle and longest blade that is comfortable for that particular job in order to get maximum power into the turn.

Those are the reasons why screw drivers come in scores of sizes. But that does not require a stocking a wide assortment in your toolbox. Actually, your own requirements will limit the range of sizes you're likely to need and there is, of course, a certain amount of leeway permitting one size to cover a number of screws.

It is best to standardize your workshop with a limited number of screws





for everyday jobs. This is a good rule to follow for other items as well and will enable you to tackle your projects efficiently with the tools at hand.

Common Sizes

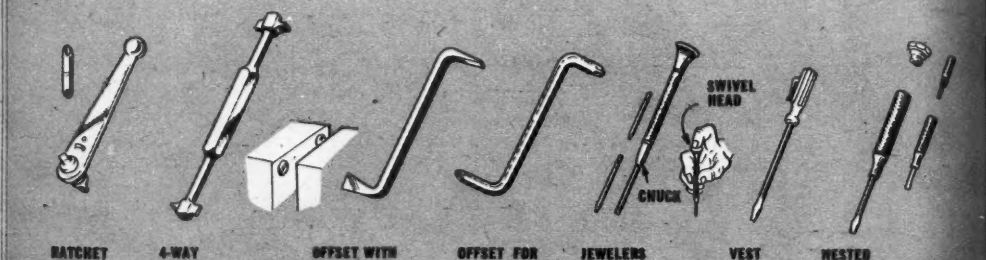
Screw driver sizes are designated by the length of their blades or shanks, plus the tip size. The width of the tip determines its thickness, thus indicating the sizes of screws it will handle. Generally the blade lengths increase with the size of the tips, as greater leverage is required for larger screws.

An excessive blade length for a small-size screw is not comfortable or practical. There are special jobs, however, that require extra blade length with small tips, as for radio chassis and typewriter work; for these purposes the parallel-side tips are recommended. These tips are the same width as the diameter of the blade shaft.

Fortunately, screw drivers are very low in cost, ranging from as little as 10c to about $1.50 each, so just a few dollars will give you a pretty good assortment.

You should have a three-inch narrow tip size, and four-, six-, eight- and ten-inch sizes with standard tips; also a "stubby" for close-quarters work and one four-inch offset screw driver. At least one screw driver should have a plastic handle for electrical work.

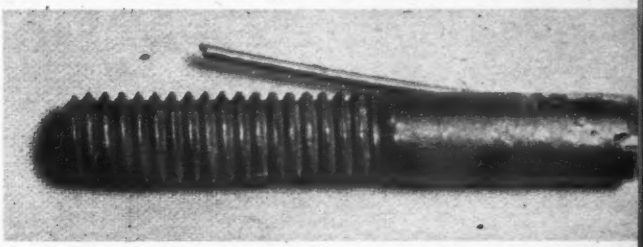
Many appliances and automobile fastenings use Phillips screws. A full set of these tools would number 1 to 4. Phillips screws are a patented type consisting of [*Continued on page* 161]



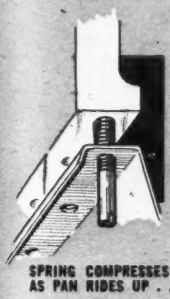
AUTO KINKS

LIGHT OIL applied along the chrome trim of your car discourages rust, keeps enamel from chipping on line of contact.

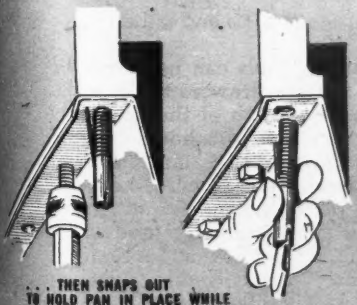
TWO OR THREE STUDS WILL HOLD OIL PAN IN PLACE



HOME-MADE STUDS make it a snap to replace the oil pan, an awkward task for one man. Drawings show how it is done.

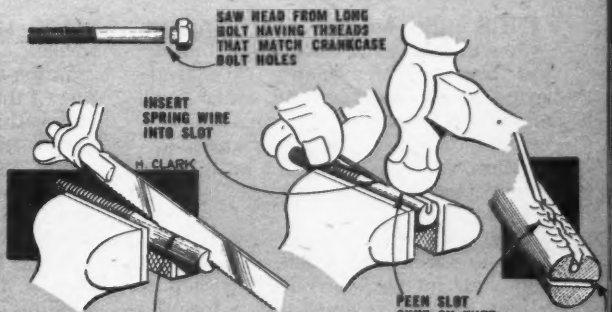


SPRING COMPRESSES AS PAN RIDES UP . . .



. . . THEN SNAPS OUT TO HOLD PAN IN PLACE WHILE BOLTS ARE SECURED

STUDS ARE REMOVED TO COMPLETE BOLTING



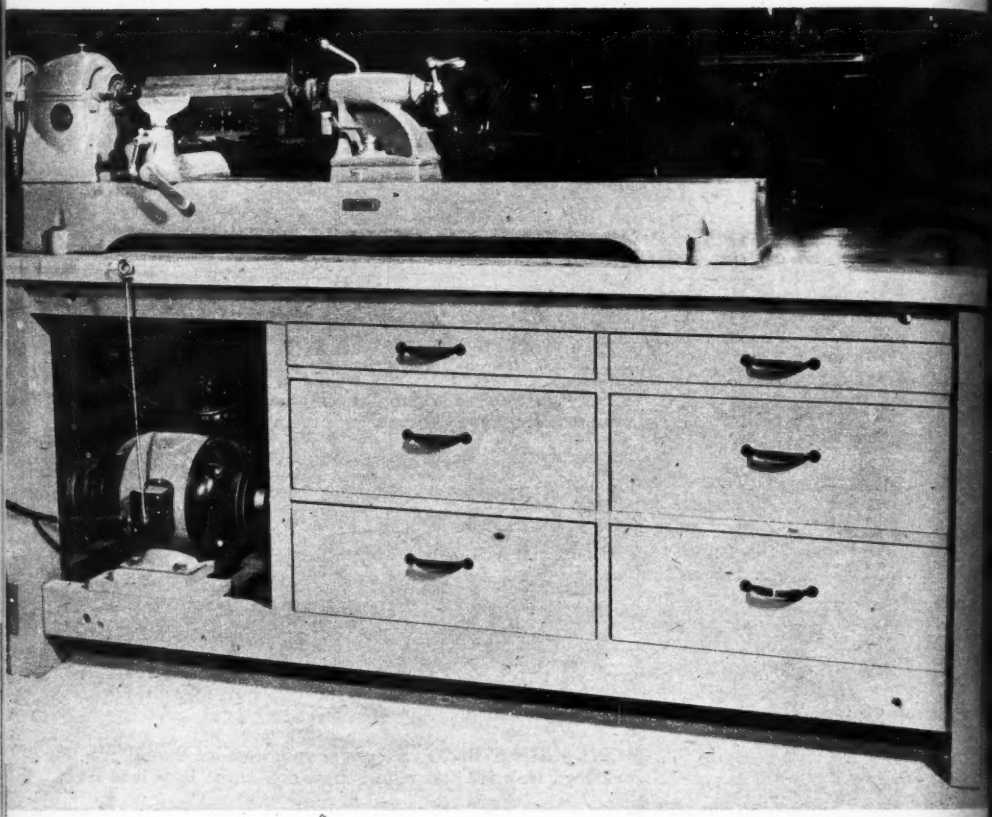
CUT SLOT ON 10° TO 15° ANGLE

PEEN SLOT SHUT ON WIRE

CUT SLOT FOR SCREWDRIVER

Build It...

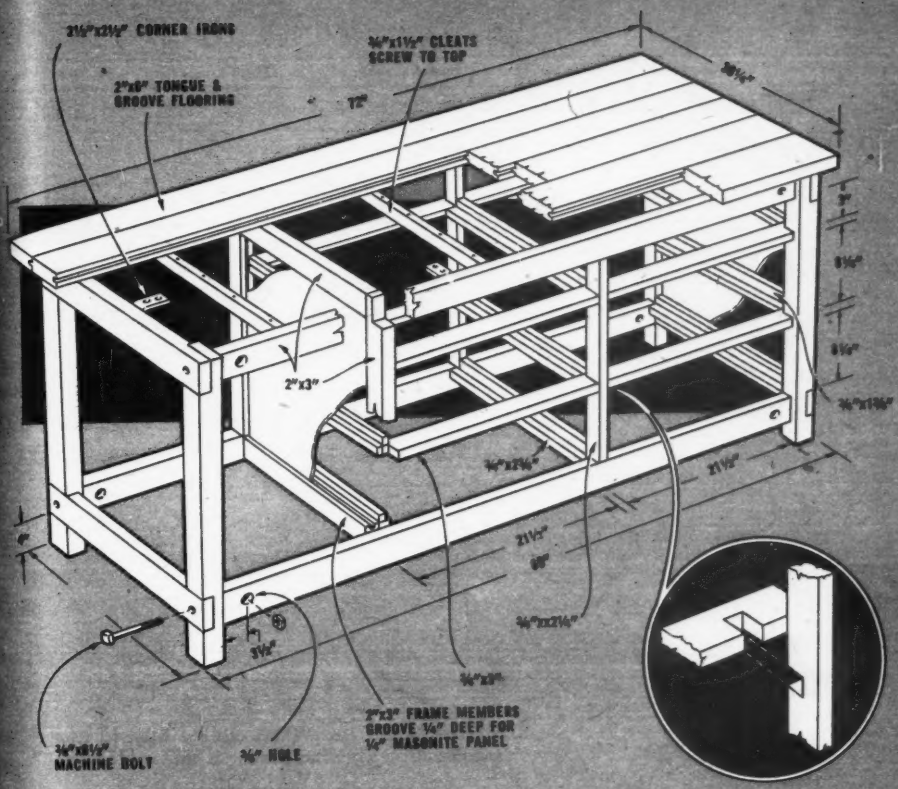
UTILITY LATHE BENCH

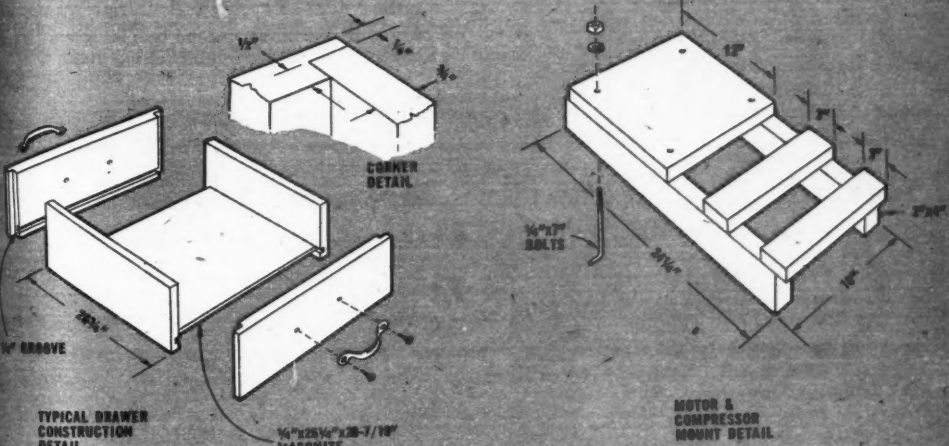


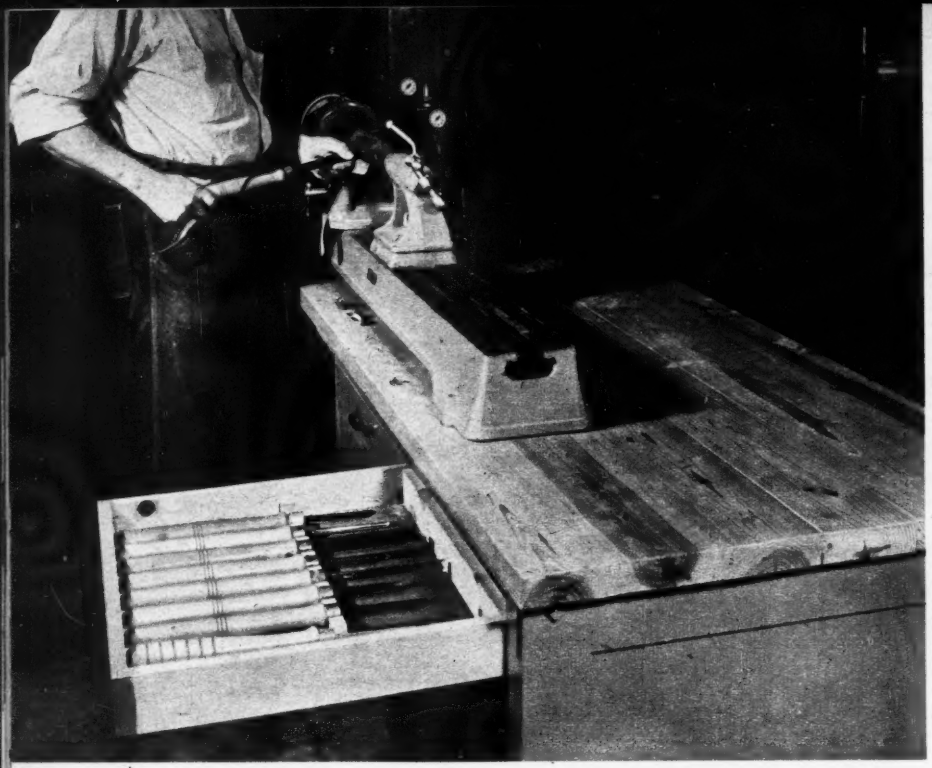
THIS utility bench not only supports your lathe with unequaled stability but also provides plenty of storage space for accessories and other tools under a bench top of generous yet convenient dimensions. As an added attraction, we have installed a built-in air compressor for spray painting, but this is optional.

The six slide-through drawers are accessible from either side of the bench and their interiors are fitted with partitions, blocks, clamps, etc., for the orderly storage of tools and lathe accessories.

Lathe-turning tools can be stored in one of the shallow drawers to the right and within easy reach of the operator. These drawers will also house honing stones of various sizes and shapes, rulers, calipers, tool rests, lathe centers, face plates and most of those other small and frequently used lathe parts. The deep drawers accommodate grinding wheels, buffing wheels, sanding disks and other larger jigs and


2½"x2½" CORNER IRONS
¾"x1½" CLEATS SCREW TO TOP
2"x6" TONGUE & GROOVE FLOORING
72"
30¼"
9"
8½"
8½"
¾"x1½"
2"x3"
¾"x2¾"
21½"
21½"
9"
¾"x2x2½"
3½"
¾"x3"
2"x3" FRAME MEMBERS GROOVE ¼" DEEP FOR ¼" MASONITE PANEL
¾"x8½" MACHINE BOLT
⅜" HOLE


½"
¼"
¾"
CORNER DETAIL
12"
3"
3"
2"x4"
¼"x7" BOLTS
24¼"
16"
28¾"
¼" GROOVE
TYPICAL DRAWER CONSTRUCTION DETAIL
¼"x25½"x28-7/16" MASONITE
MOTOR & COMPRESSOR MOUNT DETAIL



SLIDE-THROUGH DRAWERS can be opened from either side. Note dividing partition, built-in tool rack.

attachments for the lathe.

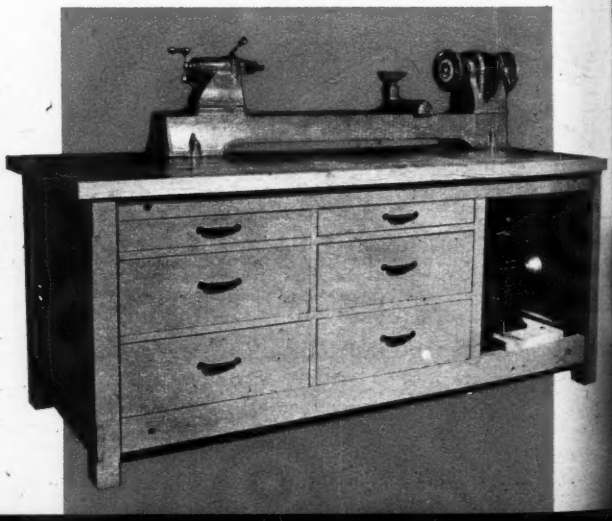
Construction of the bench is comparatively simple; there is no complicated joinery involved. All joints are either butted or lapped. The bench can be built entirely with hand tools although power tools simplify the job.

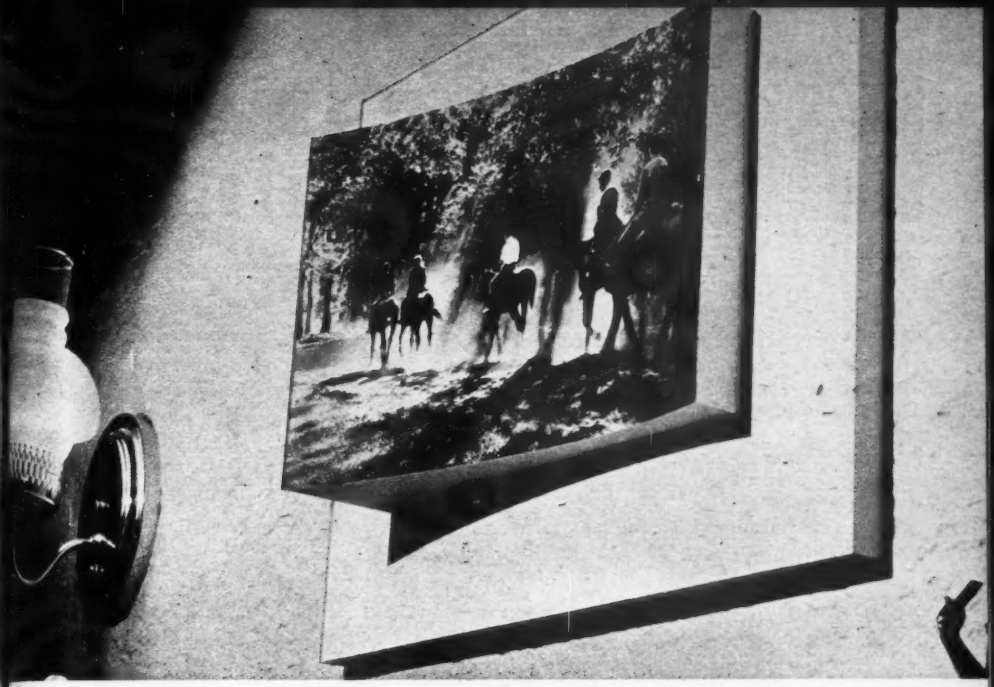
Any seasoned lumber will make a suitable bench. In this case fir was used for the heavier members of the frame and No. 5 white pine for the drawers and drawer supports.

A really good top can be made by using hard maple strips assembled on edge and bolted together.

The height of the bench is 32½ inches, which is about right for the average operator.—*H. R. Clark*

REAR VIEW of lathe bench shows the ample space available for the compressor mounted behind motor.





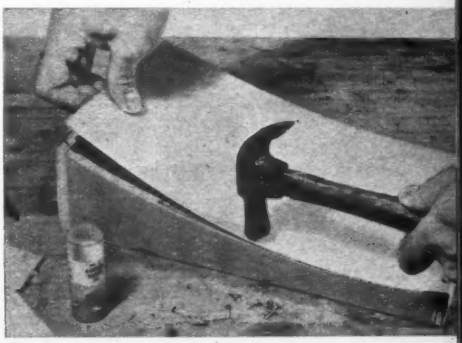
ORDINARY PICTURE on three-dimensional panel creates new effect of movement and life.

Display Your Photos in THREE DIMENSIONS

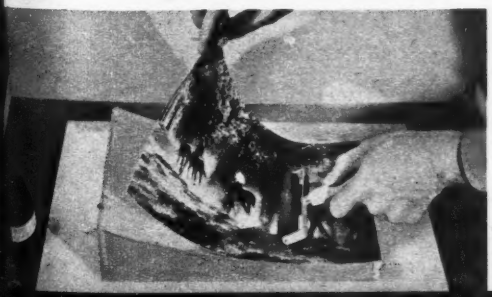
STAID old frames will be passé when you see the new vitality pictures acquire mounted on these modern three-dimensional projections.

The two curved plywood sides of the frame should be cut together for uniformity. When assembled, fix a sheet of cardboard to frame with tacks. Glue frame's bottom edges, then center on backboard. Use rubber cement to mount picture on cardboard.

Size of the picture will determine dimensions of the frame and backboard. •



CURVED FRAME of plywood scraps is assembled with tacks and glue; now tack on cardboard facing before painting or staining.



PICTURE is affixed to frame with rubber cement. Use of a roller as shown insures adhesion, keeps fingerprints off picture.

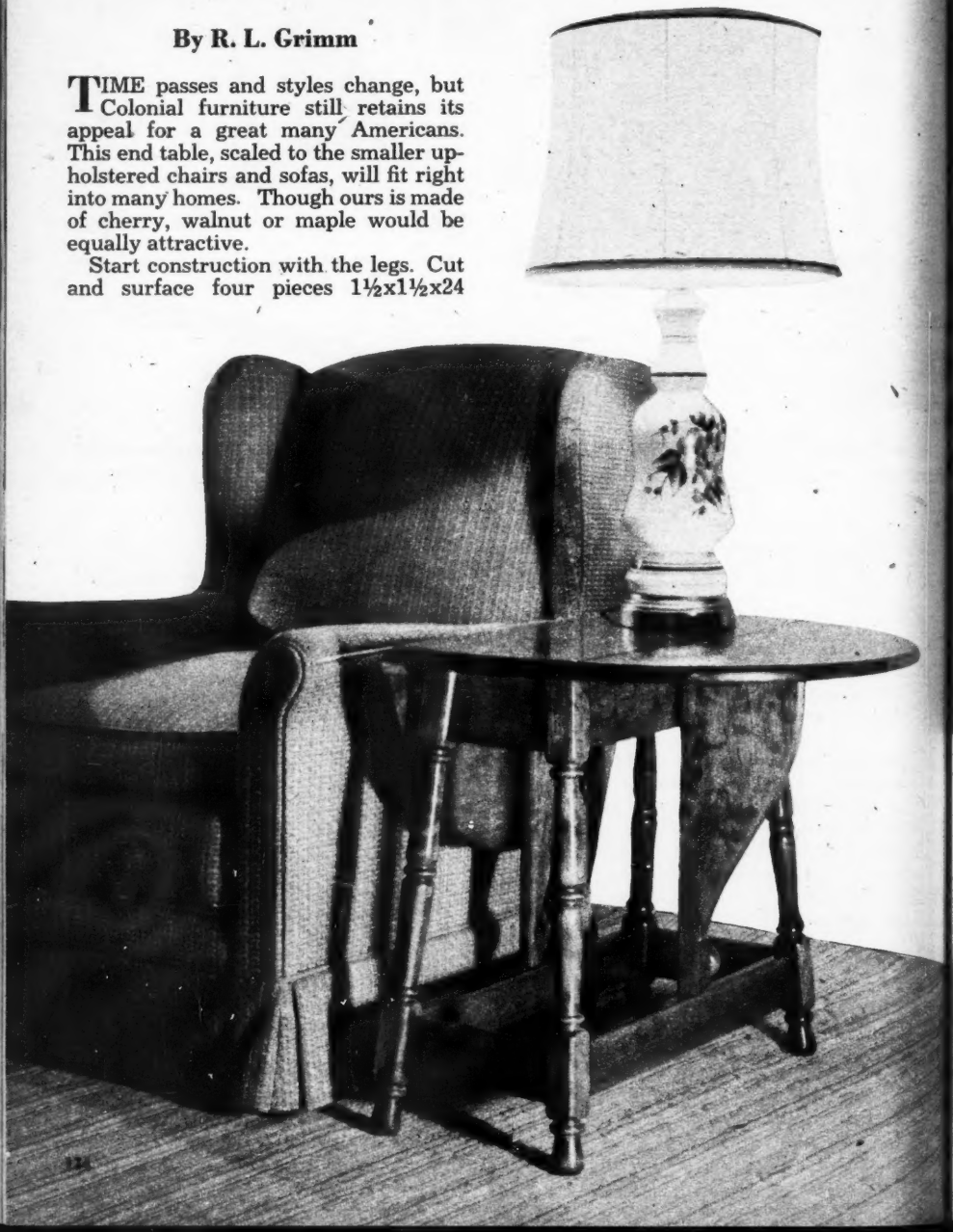
Make It...

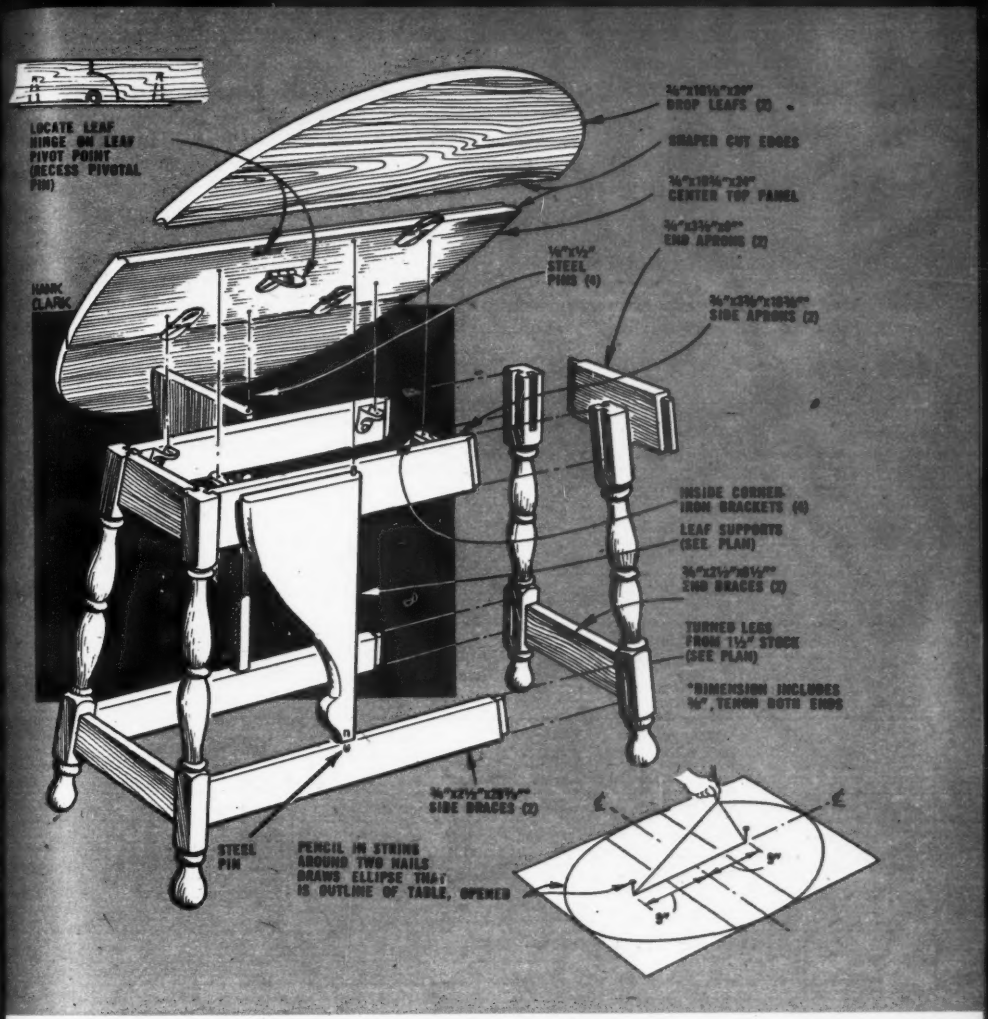
DROP LEAF END TABLE

By R. L. Grimm

TIME passes and styles change, but Colonial furniture still retains its appeal for a great many Americans. This end table, scaled to the smaller upholstered chairs and sofas, will fit right into many homes. Though ours is made of cherry, walnut or maple would be equally attractive.

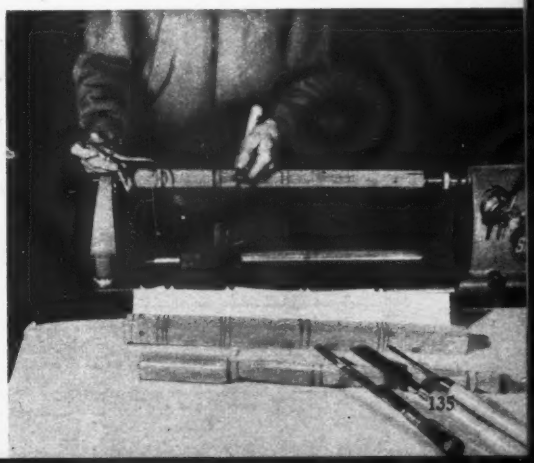
Start construction with the legs. Cut and surface four pieces 1½x1½x24





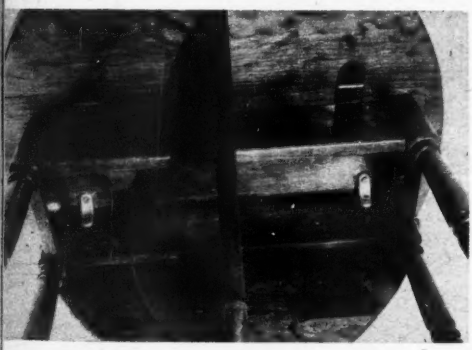
inches long and mark them out as shown in the second drawing. Then mount the pieces in the lathe and turn them to shape. Mortises are cut to the dimensions shown on a 5° angle from the horizontal (tilt drill press table 5°) to match the 5° cut off on the ends of the legs. To cut the top end of each leg at a compound angle, set the table (or saw blade) at a 5° tilt and also set the miter gauge at 5°. If possible, finish the job on a disk sander set to the same angle.

Cut the aprons and braces next, mak-



THE LEGS are turned from 1½-inch square stock: making a full-size template helps.

TENONS AND ENDS of crosspieces, as well as mortises in legs, are cut on 5° angle.

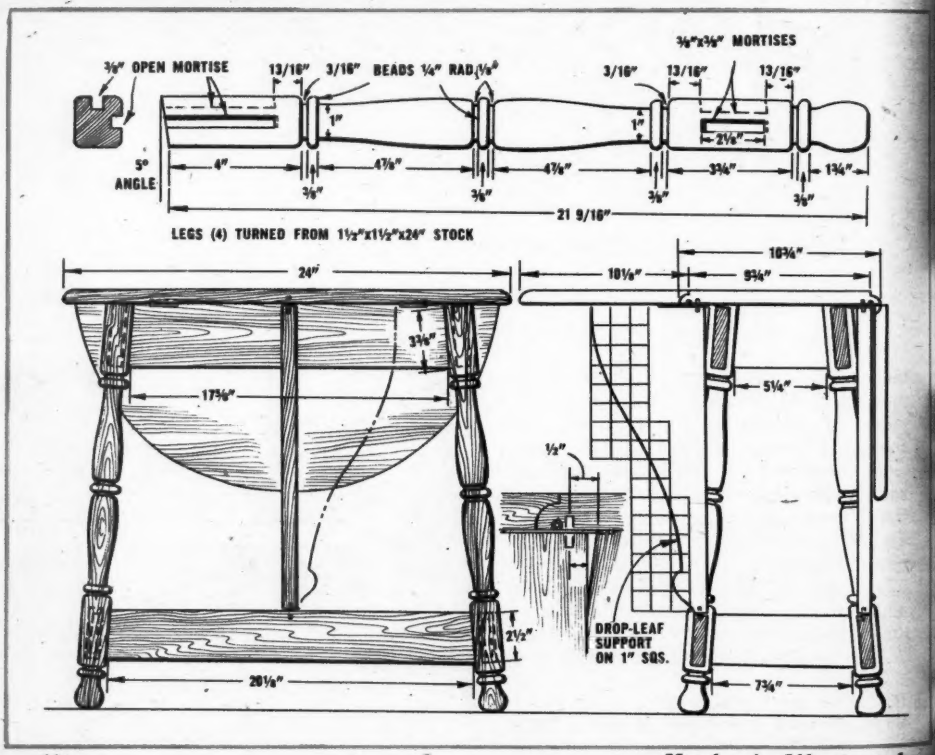


BOTTOM VIEW shows how corner brackets are used to fasten the top to the base.

ing sure to allow for the tenon on each end. Bore a ⅛-inch hole ¼-inch deep and 5° off the vertical in the center of each side brace for the steel pin which holds the drop-leaf support. After checking your work, sand and assemble the base.

Lay out the pattern for the two drop leaf supports and cut them out with a jig or band saw. Then bore a ⅛-inch hole, ¼ inch deep, in the top and bottom of each for the steel pin. Round the edges to a $\frac{3}{16}$-inch radius and sand the pieces smooth.

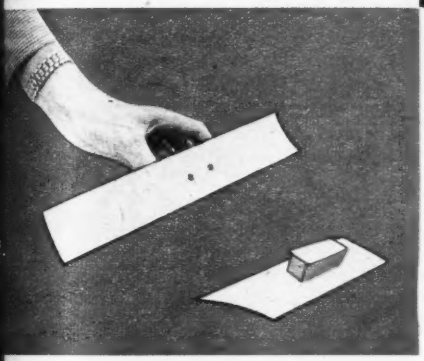
For our table, the top, including the drop leaves, was made from glued-up stock and the drop-leaf joints were cut with matched drop-leaf joint shaper cutters. If such cutters are not available, the edges may be left square, but in that case the center part of the table top should be cut to only 9¾ inches wide. •

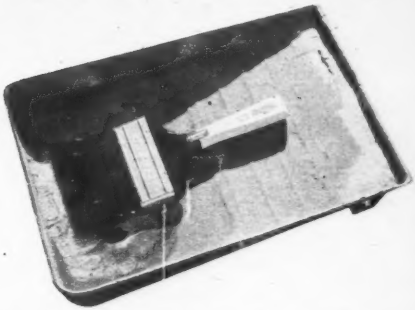


FRESH PAINT TIPS

TIP-PROOF TRAY made from lumber and Masonite is secured to the top of a ladder with bolt and wing nut.

METAL GUIDES for painting window sash and trim are cut from Venetian blind slats; nails hold the handles.



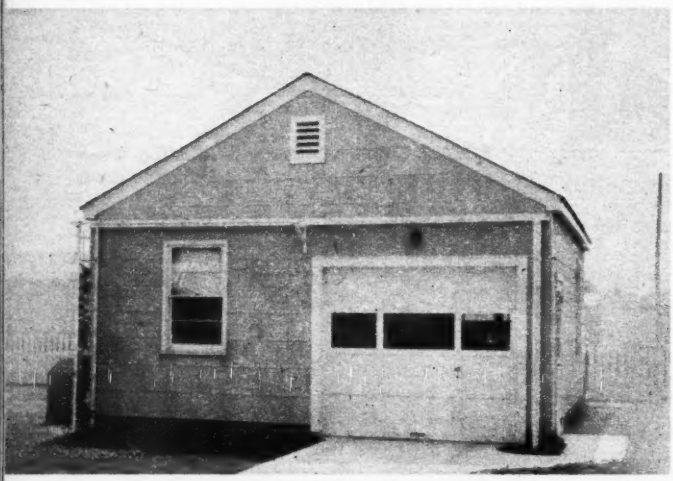


ROLLER TRAY is good for cleaning large brushes; very little solution is required.

RUBBER DOOR STOPS nailed to top of ladder keep it from slipping and marring walls.

Golden Hammer Award Winners

SPORT CAR has Crosley chassis, sheet metal body. It cost builder Eugene Eick, Middleport, N. Y., $350 and 9 mos. work.



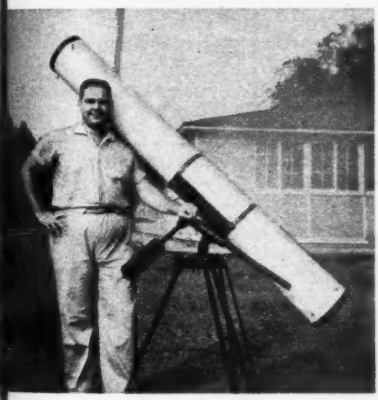
GARAGE-WORKSHOP took Clarence Checklin, Elizabeth City, N. C., 8 mos. to build. Left side is shop, garage is on right.

GRANDFATHER CLOCK was handmade—with the exception of the mechanism itself—by G. E. Hendrickson of Argyle, Wis.

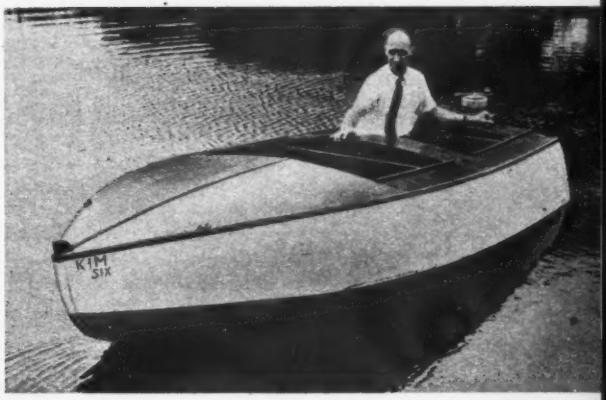
GARDEN TRACTOR and model traction engine were built by Herb Warner of Garden City, N. Y.

Each craftsman whose project is shown has received a 24-karat gold-plated Hammer and a Workbench Award Certificate. How about sending us a *black-and-white* photo and *full* description of your latest project? If you aren't a winner you may still receive as runner-up prize a 14-karat gold-plated Golden Hammer Tie Bar or MI's Certificate Of Merit. Photos of you and your workshop are also eligible. Send entries to MECHANIX ILLUSTRATED Golden Hammer Awards, 67 West 44th St., New York 36, N.Y. If you want entries returned, please enclose postage. Entries cannot be acknowledged.

The following craftsmen have been awarded GOLDEN HAMMER TIE BARS for their projects: Terry Rost, Portland, Ore.; S. C. McCrae, Salina, Kansas; Geo. E. O'Connor, Duluth, Minn.; Richard Fahsel, Rochester, N. Y.; Albert Krahner, New York, N. Y.; Robert L. Bolen, Ashland, Ohio; C. E. Pangborn, Clayton, Wash.; Louis Darocy, Scranton, Pa.; Walter Losinieckl, Chicago, Ill.; J. H. Murphy, Sheffield, Ala.; E. Sims, Laguna Beach, Fla.; Fred S. Norcross, Roswell, N. Mex.; David N. Mears, Md.; Bob Severson, Van Nuys, Cal.; Robert M. Musick, Escondido, Cal.; William J. Schmidt, Snyder, N. Y.; Dick Faust, Oshkosh, Wis.; Henry E. Rachow, Rochester, N. Y.; Eduard M. Vajda, Columbia, Pa.; Frank Dawson, Republic, Mich.; Morris Segal, Chicago, Ill.; Mitchel Barrett, London, England; Robert Talbot, Walnut, Ill.; and Elbert Basham, Deputy, Ind.



TELESCOPE by Richard Hoffman, Belleville, Ill., has 8-inch mirror, equatorial mount.



SPORTSTER (an MI boat) was built by J. M. Newman of Kennington, N. Oxford, England.

HI-FI unit includes AM-FM, 3-speed phono and a tape recorder. By Larry Kuszmaul, Collingdale, Pa.

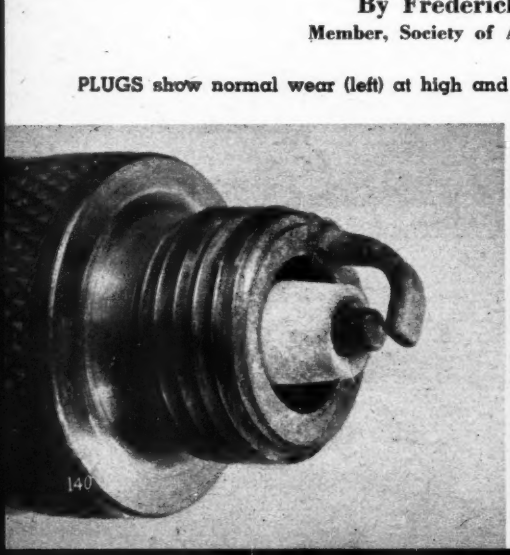
CAR CARE

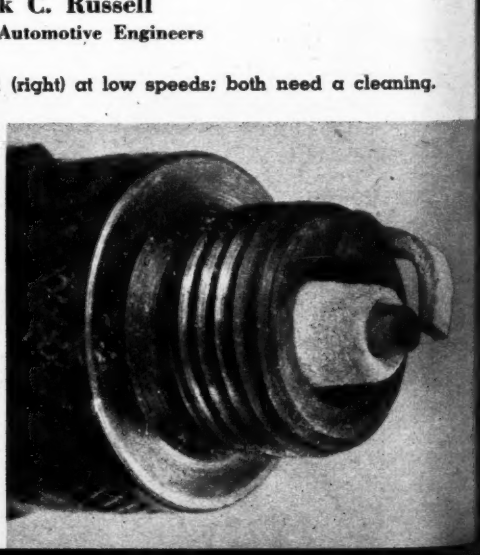
Cleaning and setting spark plugs is a job any car owner can do in less than an hour.

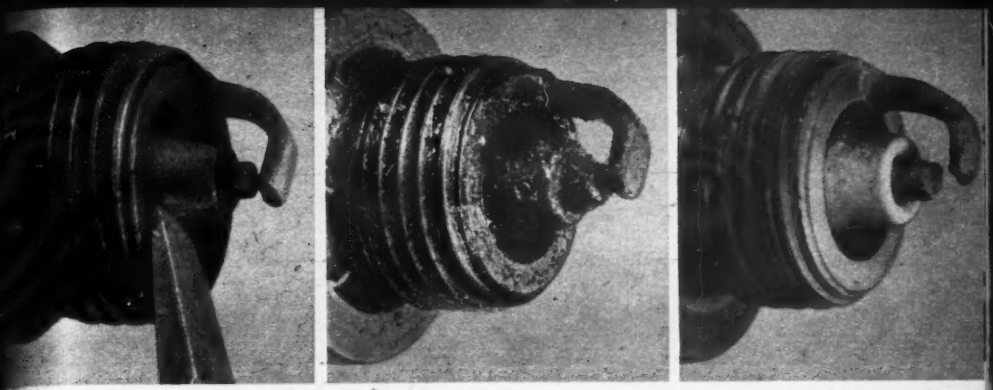
ALL ABOUT SPARK PLUGS

By Frederick C. Russell
Member, Society of Automotive Engineers

PLUGS show normal wear (left) at high and (right) at low speeds; both need a cleaning.







CARBON DEPOSITS (left) indicate over-rich mixture, dirty air cleaner. Try using hotter plugs if you notice that oil accumulates (center); or cooler ones if your plugs overheat (right).

IF YOU enjoy an hour or two of week-end tinkering on the family car, here's a recipe that'll pay big dividends in gas savings and improved performance. Even on today's complicated cars you can do a smart tune-up job with a few simple tools.

Air Cleaners

Number one on the list of potential gas wasters is the air cleaner. If clogged it will restrict the flow of air to the carburetor and will act as a partial choke. Some of the newer cars are equipped with a dry paper filter which can be removed in a jiffy and tapped gently to shake out excess dirt. Wipe out the housing too, as dirt drops off the filter and collects on its base. Most manufacturers recommend that the air filter be cleaned every 2,500 miles and the element replaced every 10,000 miles.

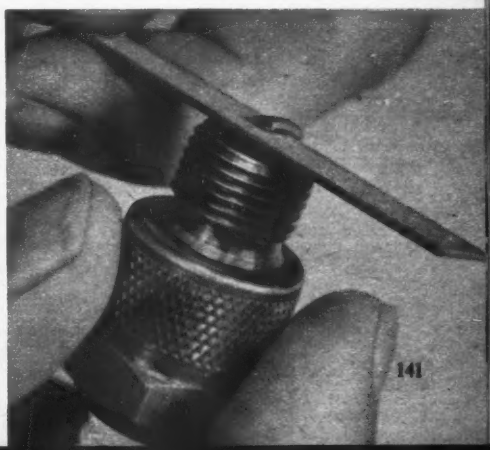
If your car has the oiled wire mesh or oil-bath type of air cleaner, wash it out thoroughly in kerosene or other suitable cleaning solvent, then let drain.

On the oil-bath type, clean out the oil reservoir in the housing and put in fresh oil. Follow the manufacturer's recommendations on oil viscosity—usually the same weight as the engine oil. With the air filter cleaned, you've already done a lot to cut down on gas bills.

Air Leaks

Other points, often overlooked, are

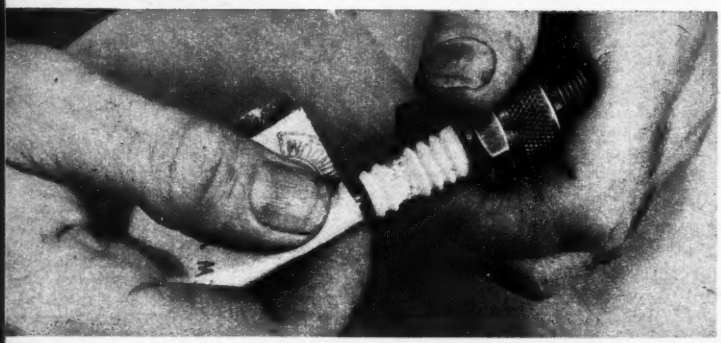
SOAK old plugs in solvent, then clean threads with a stiff brush and wipe dry.



FILE points until bright, being sure to clean away the filings before replacing the plugs.

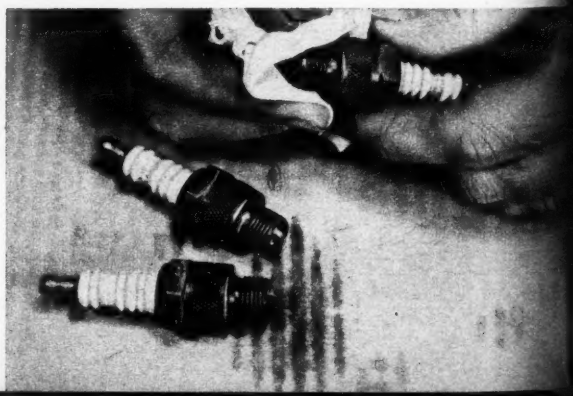
SPARK PLUG adjusting tool has a full set of wire feeler gauges and other attachments used on plug repair jobs. Here a wire gauge is being used to measure gap accuracy.

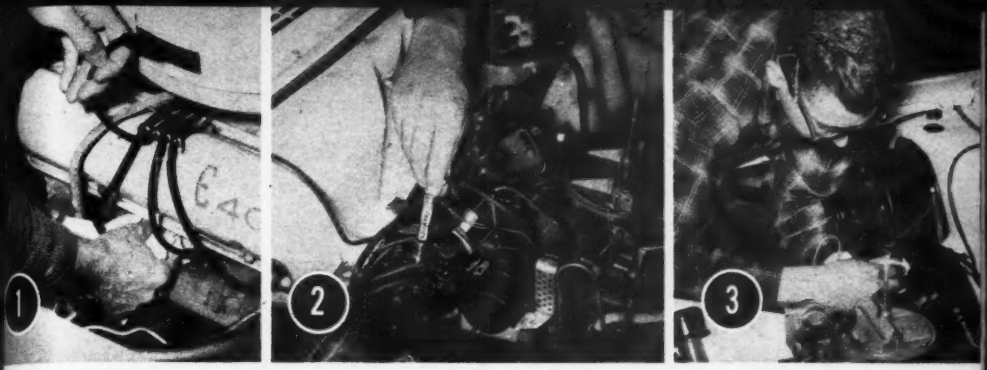
ROUND feeler gauge is used to set the gap of the plug's electrodes to the manufacturer's specifications. Bend only the side electrode, then re-check gap with gauge.



CENTER ELECTRODES should be brightly polished and thoroughly cleaned before replacing plugs. Shine them with a piece of fine-grain sandpaper, then wipe clean.

WHEN SPARK PLUGS have been thoroughly cleaned and dried they should be tested against new ones on a comparator machine before being re-installed in your engine.





SOME LAST-MINUTE CHECKS: (1) A final dusting of spark plug electrodes. (2) Checking plugs with a pin-point tester. (3) Wiping clean all connections on the distributor cap.

the nuts which hold the carburetor to the intake manifold, as well as the manifold nuts themselves. Air leaks at these points will cause an excessively lean mixture, resulting in loss of power, uneven idling and the danger of burning valves.

Spark Plugs

Regular servicing of the spark plugs—the heart of your ignition system—is a must to keep these 300 under-the-hood horses from falling by the wayside.

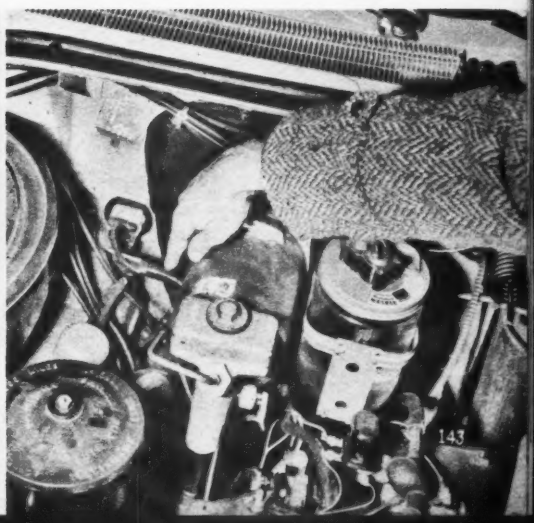
Check your ignition system's high tension wiring with a firing indicator before removing the spark plugs for cleaning. If the engine's been misfiring, you may be able to pin-point the trouble with one of these neon testers. Running it along the high tension leads may reveal poor insulation or crossfiring. These testers will also tell you if a particular plug is shorted out.

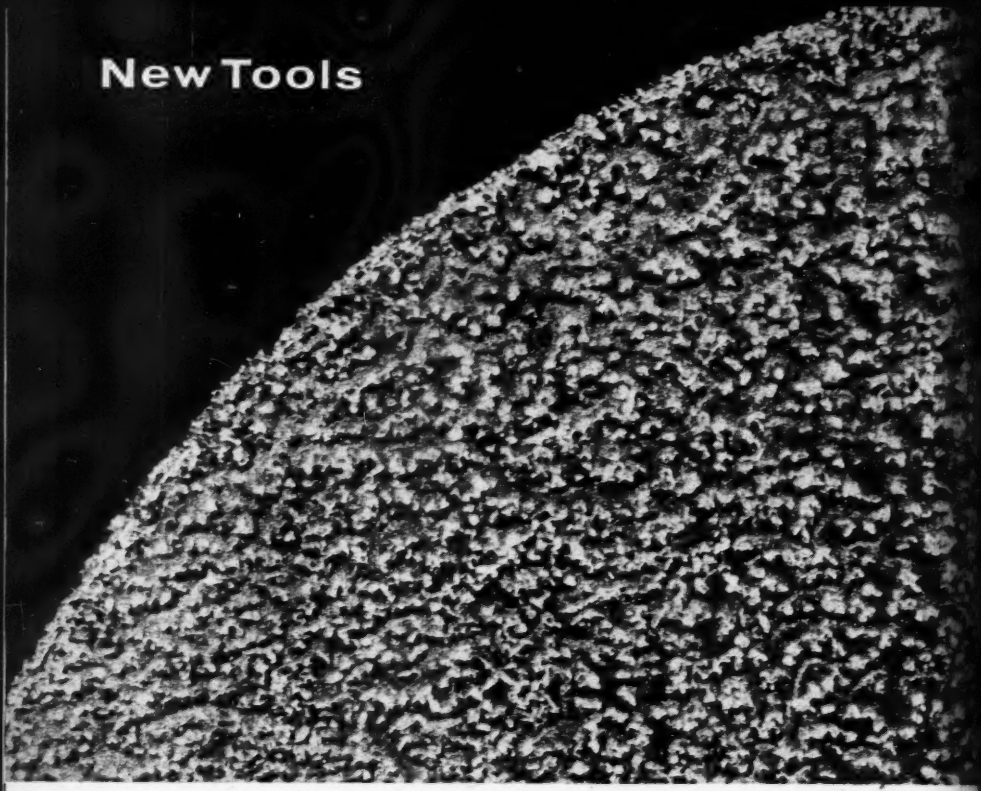
The spark's not everything, but it's mighty close to it. If it is weak or even slightly unsteady it not only produces a poorly fired mixture but, by its effect on the engine, may put a crimp in the car's automatic transmission—as well as in your wallet.

It may be surprising to many motorists that neglected spark plugs can be the source of a flock of engine ailments. So check your plugs regularly to head off trouble before it reaches the painful stage. [*Continued on page* 147]

CLEAN AIR FILTER, or replace if necessary, for maximum spark plug efficiency.

AUTOMATIC CHOKE can be a real gas robber: check it when you start cold engine.





CLOSE-UP of the coarse-grit side of saw wheel: wide-spaced grits discourage clogging.

TUNGSTEN CARBIDE

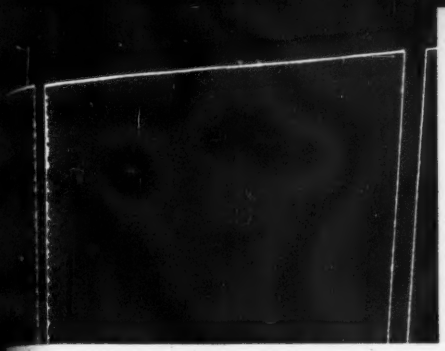
NEWEST WORKSHOP TOOL

COMPLETE SET of Perma-Grit tools. Gritter (upper left), shaper (bottom), saw wheel and shoes.

By R. J. Capotosto

A NEW line of abrasive tools has just hit the market. They're called Perma-Grit T-C Abrasives and are manufactured by the Skil Corporation of Chicago.

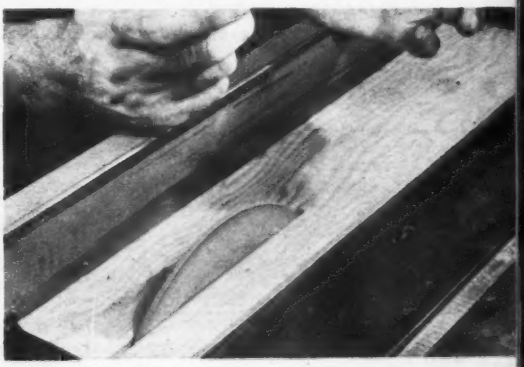
Perma-Grits are unique in the literal sense of the word. They are fabricated under an exclusive process that brazes grits of tungsten-carbide—surpassed only by diamonds



NOTE CLEAN CUT (right) made by grit wheel compared to circular saw cut (left).

SHAPER cuts on all strokes; has coarse grits on one side, medium grits on the other.

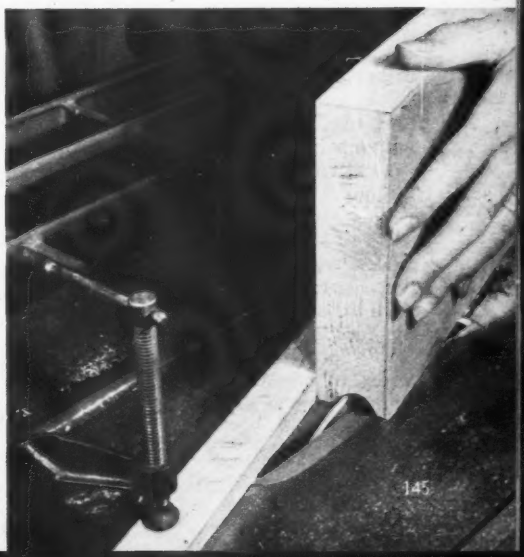
"TWO-FACED" saw wheel has both coarse and medium grit surfaces for sanding jobs.



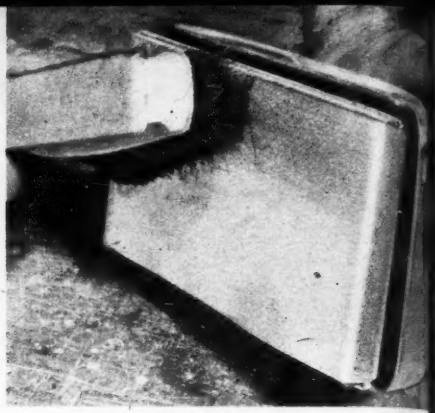
WHEEL SAW of tungsten-carbide grits will cut wood, plastics and composition board.

TO DADO, cut extreme limits, then feed work sideways to remove stock in between.

COVE CUTTING with the Perma-Grit Wheel will give you a smooth and finished job.

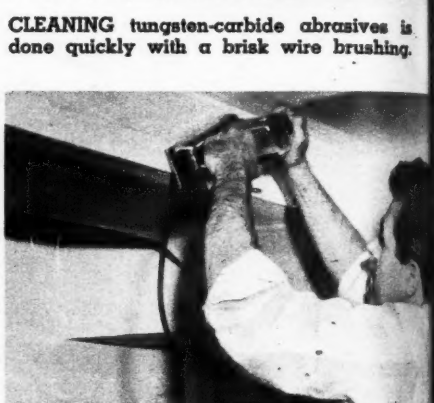


PERMA-GRIT SHOES fit on most sanders: they don't tear, even under rough usage.



CLEANING tungsten-carbide abrasives is done quickly with a brisk wire brushing.

FINE GRIT shoes are excellent for sanding down furniture prior to refinishing.



T-C GRITS resist clogging even when used to smooth joint cement and plaster walls.

in hardness—on steel. When the abrasives become gummed or clogged after long use, they can be quickly restored with a solvent rinse or by wire brushing.

That is the beauty of these tools from the point of view of the home craftsman —they virtually last forever. A loaded sheet of sandpaper is tossed out and replaced with a new sheet. Not so with these abrasives. A few strokes with a wire brush or a dip into turpentine and the tool is new again.

The four Perma-Grit tools of most interest to home craftsmen are the T-C Gritter, the wheel, the shaper and the shoe.

Probably the most remarkable of these new abrasive products is the Perma-Grit saw wheel which sands as it cuts. Designed for table and radial saw use, it is eight inches in diameter and will fit a ⅝-inch arbor. The wheel has fine grits on one side and coarse on the other as well as grits on the rim. It is a circular saw, disk sander and jointer all in one. It cuts wood, plastics and composition materials without crazing, chipping or generating heat which can melt the material and fuse the saw kerf.

These abrasive tools should last indefinitely in the home workshop.

All About Spark Plugs

[*Continued from page* 143]

Trouble Shooting

For example, say that you're one of those rare birds—a good driver. You're a cool operator in traffic and you're content to let the speedo indicator hover at 65 on the highway. One day it dawns on you that your particular piece of rolling stock isn't as responsive as it should be on hills and when passing.

You check in at the garage, the mechanic takes a fast look at your badly burned plugs and says, "Man, you must really hit it up on the pike." You protest your innocence, so the mechanic checks further and finds your engine has been suffering from a long period of overheating, late ignition timing being the real cause.

Later in the day this same mechanic decides to be a little less hasty in his observations while inspecting another set of plugs. The points of these he finds to be fouled up with oil, although the engine had been normally warmed up at the time. His first idea is that the plugs are too cool a type for the engine or for the limited use the car got. But remembering his earlier boner he decides to look a little further.

First thing that catches his eye is an extremely dirty oil filter pipe. Checking the oil and finding it dirty seems to confirm this, but he decides to take a compression reading of the cylinders. As he suspects, they are all way below par, hinting strongly of sticky or worn piston rings. A third check shows the windshield wipers slowing down when the engine is accelerated. A leaky diaphragm in the booster side of the pump is permitting oil to suck into the cylinders.

Thus we get a surprisingly fine check on what's what with the engine when we take out the plugs and see how they look.

Servicing Your Plugs

Place the removed plugs in some improvised holder so as to indicate from which number cylinder they were taken. Thus, if there is some unusual condition which any particular plug reveals you'll know which cylinder is involved. If one plug shows a badly fused or blistered insulator, for instance, there may be water leaking into its cylinder. An oily plug may indicate ring trouble.

Plug threads are now cleaned with a wire brush and oily deposits removed with a solvent such as alcohol.

Removing carbon from the electrodes is fairly easy, but the insulator should be sand-blasted at your local garage.

Brighten the electrodes with a thin, flat file. Use a round feeler gauge to accurately reset the plugs for proper gapping. The gap between electrodes must be exactly what the manufacturer of your car recommends.

Should the old plugs be used again? With today's engine performance it may be necessary to discard a set of plugs at 8,000 miles or even less. Much depends on the way the car is driven. It will be apparent if your present plugs are right for your car when you take them out and examine them.

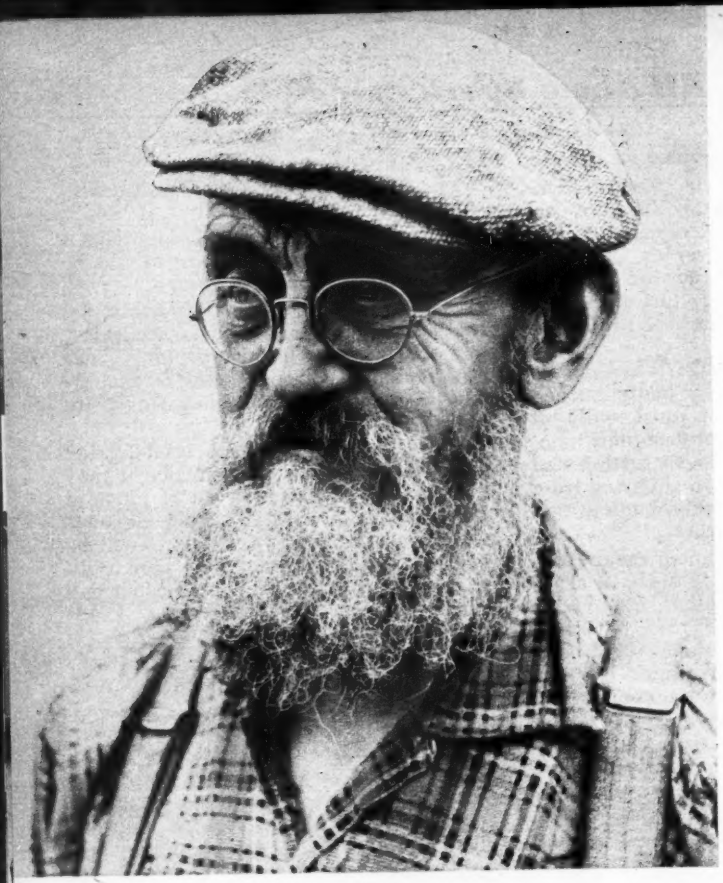
If they're being overheated you'll know it by badly eroded points and a white or blistered nose on the insulators. You should switch to the next cooler-type plug. Your dealer has a plug chart to help with the selection. Even if only a few of the plugs look this way there may be trouble such as an air leak in the intake manifold. Think back over the way the engine has been acting; if it has been pinging and overheating it may need a motor check-up, not necessarily new plugs.

Oily deposits on plugs can be the result of a variety of engine conditions including worn rings, a leaky vacuum booster of the dual-type fuel pump, too high oil pressure, or worn valve-stem guides. But if you can't seem to locate a definite cause of the trouble try a set of hotter plugs.

New engines may foul up their plugs during the break-in period, which is why a cleaning is advisable at 2,000 miles or so. Heavy carbon deposits on the plugs could mean an over-rich mixture from a faulty automatic choke, too much city driving, a dirty air filter or a high carburetor float level. Here again, assuming no serious engine condition is found, a set of hotter plugs is the answer.

Normally plugs should look brownish, or show a grayish tan, if the car is driven in the city and on the open road in fifty-fifty proportions. If driven mostly at low

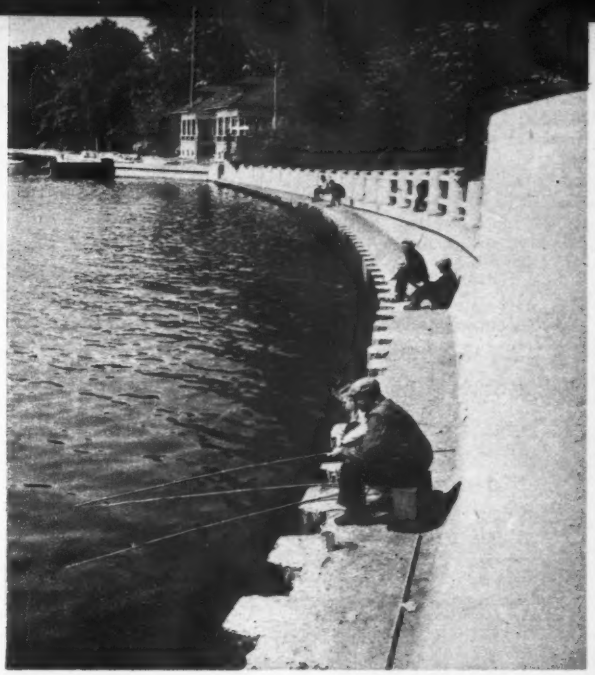
[*Continued on page* 158]



1st Prize ($25) .....SAGE
M. B. Long, of Victoria, B. C., Canada, took this portrait with a Korelle Reflex. He exposed Adox film: f5.6, 1/100th.

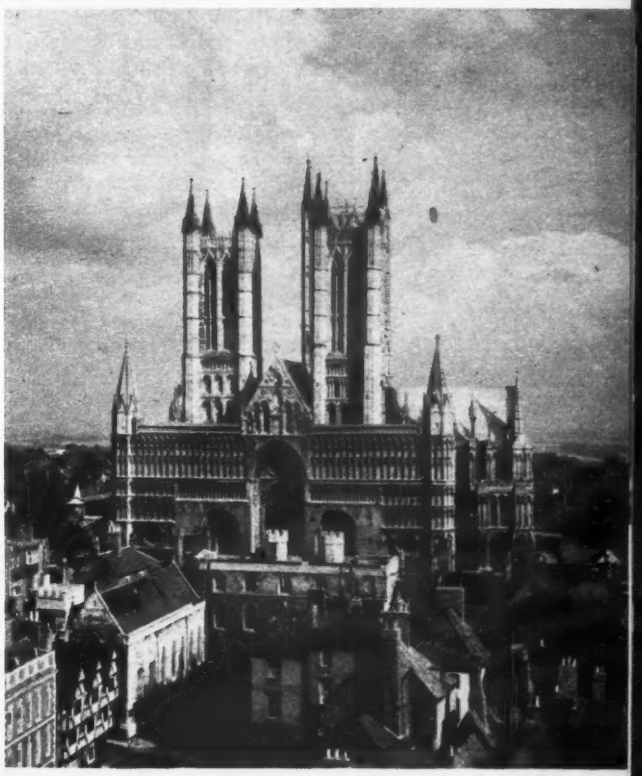
MONTHLY PHOTO CONTEST

$10 Award ....."NO COMMENT"
Buck Hoeffler, E. Greenwich, R. I., caught these expressions with his Rolleiflex. He exposed Verichrome Pan, had setting of f-8 at 1/100th.



$10 Award .....JUST FISHIN'
Ed Blair, of Fort Wayne, shot with an Ikoflex. He used Plus X film with setting of f-8 at 1/100th, had K-2 filter on lens.

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope or postage for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Address entries to: *Mechanix Illustrated*, Photo Contest, 67 W. 44th St., N.Y.C. 36.



$10 AWARD ..... CATHEDRAL
Using an Agifold camera, Kieth Elliot, Sidcup, Kent, England, shot from nearby roof, exposed Ilford film at f-11 and 1/100th through a medium yellow filter.

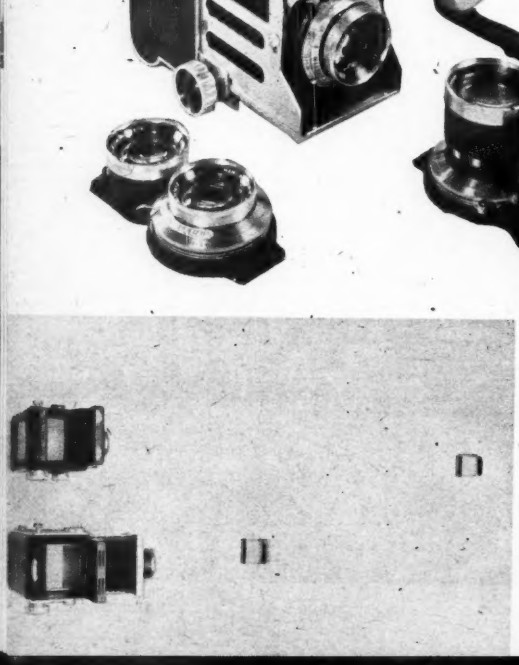
Photography Today

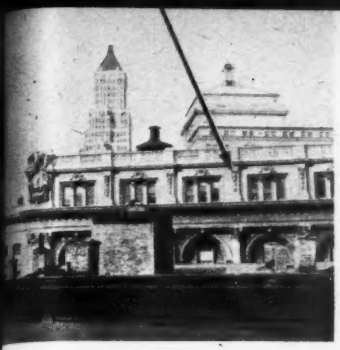
A new Japanese twin-lens reflex has a long extension bellows.

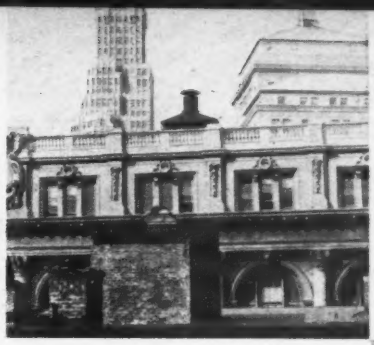
IF imitation is the sincerest form of you-know-what, then it seems to us that now is the time for German camera makers to copy features of a certain Japanese camera. To wit, as the lawyers say, the Mamiyaflex.

As every Rollei-type camera owner knows, a set of supplementary lenses are necessary for extreme close-up work. Because of its construction, a generous "bellows" is not possible—or so we have been told up to now. The Japanese, obviously unaware of this statement have added a bellows and a generous "draw" to the Mamiyaflex with some rather interesting results as shown on these pages.

BELOW LEFT: A Rollei and a Mamiyaflex battle it out for close-up honors. Below: This is what appears on the ground glass with cameras set for closest possible working distance.







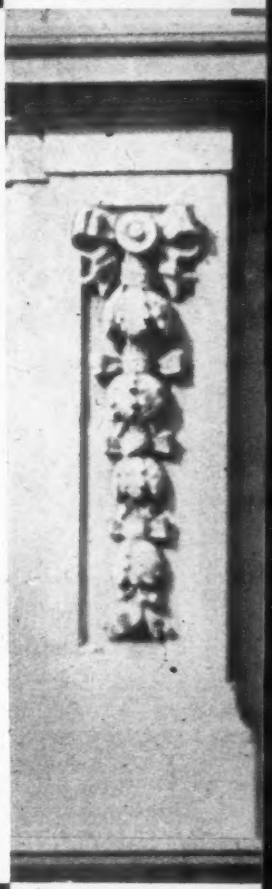
FAR LEFT: Scene taken with normal f-2.8, 80mm lens. Left: Close-up made with f-4.5, 135mm lens. Below: Extreme enlargement of detail shown by arrow.

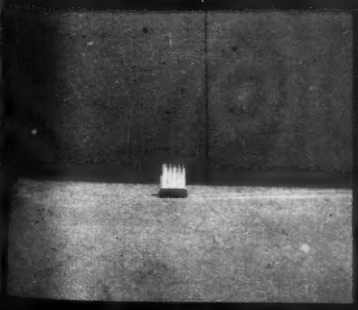
The picture in the lower left hand corner shows a Rollei and a Mamiyaflex camera with a book of matches set in front of each camera at the closest possible in-focus position. The next picture shows the actual appearance of the matches on the ground glass and the last two pictures are the actual contact prints made, at the left through the Rolleicord camera and at the right through the Mamiyaflex. A rough measure indicates that the lens extension on the Mamiyaflex camera yields a five times larger image than that possible on the Rollei camera.

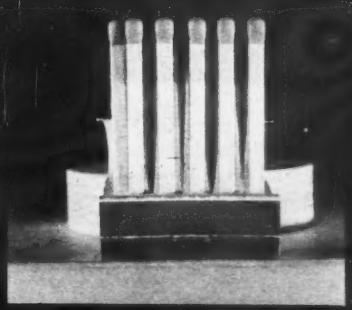
In addition to a bellows extension, the Mamiyaflex has a few other features, one of which is a means of removing the viewing and taking lenses, complete with shutter, from the body of the camera and substituting a 135mm telephoto lens. The change can be made right smack in the middle of a roll of film without fogging the film. This is ingeniously contrived by a hinged shutter controlled by a button in the right side of the camera which can be turned to "lock" or "unlock" position. When the button is turned to the unlock position the camera lens can be removed. The shutter swings into a light-tight position protecting the film.

The camera, unlike some Japanese jobs shows evidence of good workmanship and machine shop practice. The odd looking contrivance in front of the camera in the lead photo is an ingeniously designed handle which screws into the tripod socket in the bottom of the camera. In addition, the top of the handle has a shoe for the flash reflector. This is necessary as the installation of the handle bars access to the camera shoe located on the body of the camera.

Equipped with the standard f-2.8, 80mm lens and a built-in flash, it sells for $159.50. An accessory f-4.5, 135mm telephoto lens complete with viewing lens and shutter costs $99.50.—*Robert Brightman*







CONTACT PRINTS show results. Note greater magnification (about five times) possible without use of supplementary lenses.

A TEN-DOLLAR TELESCOPE

By Robert Brightman

LAST month we left you in the middle of the polishing operation. By this time your work clothes and hands have been probably stained a gory red by the rouge. You are doing fine!

The polishing stroke, as we have indicated before, is similar to the grinding stroke. In other words, two inches forward and two inches back. Keep up the good work for at least a half-hour. Now stop for a look-see.

Remove the mirror from the pitch lap, wash off the rouge, stand it on end to dry, then sit down, and cool off. When you have finished your cigarette, take a look at the mirror. Your heart will regain its lost beat when you see a gleaming polish starting to cover the surface of your speculum—a ten-dollar word for an optical mirror. You will notice, however, that polishing is more apparent in the center than along the edges. The edge of the mirror is the last surface to be polished. This is so because polishing is a kind of grinding operation with more wear taking place in the middle of the mirror.

A polishing spell should consist of at least 30 minutes. It usually takes three or four minutes for the surface of the

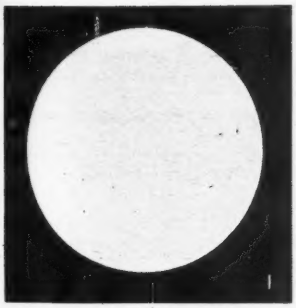
POLISHING STROKE is the same used in grinding. To parabolize, lengthen stroke.

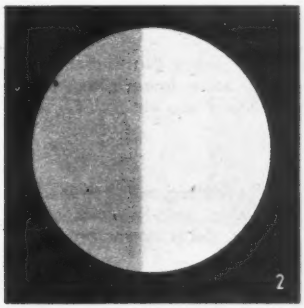
A PHOTOFLOOD REFLECTOR clamped over mirror will frustrate housekeeping enthusiasts.

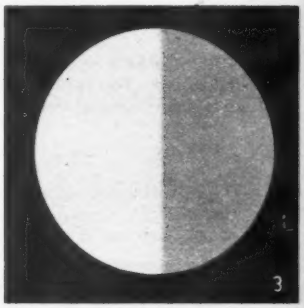
mirror and the top of the pitch lap to make good contact. For this reason there is no point in stopping after, say, ten minutes' work.

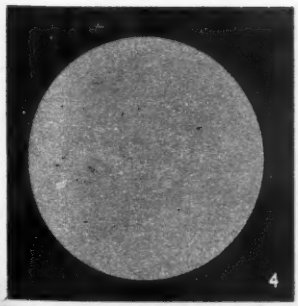
If you like you can continue at this pace for about eight hours. At the end of this time the mirror should be completely polished. But, as we humans are a curious lot, we like to see and know exactly what polishing is doing to the "figure" of our mirror. You see, what you are trying to do is grind and polish a parabola—or, as the highbrows call it, a paraboloid of revolution—for a parabola is the only

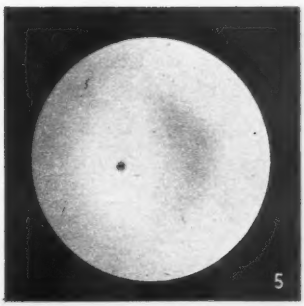
THE PINHOLE LAMP for making the knife-edge test consists of a white candelabra lamp mounted in container.



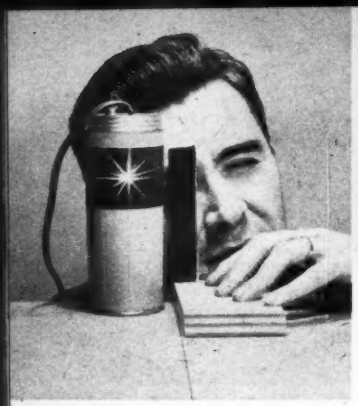


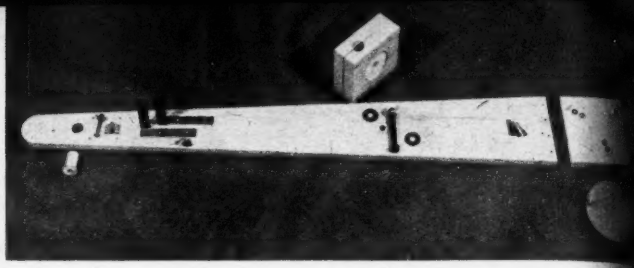






1. How mirror looks to the eye before knife-edge is moved in; it will be dazzling with light. 2. The knife shadow coming in at a point before focus. 3. The shadow will come in from the right when knife-edge is beyond the focal point. 4. Mirror darkens evenly all over with the knife-edge at the radius of curvature. 5. Shadow of a short-focus paraboloid, a doughnut shape.





HOW THE PIN-HOLE LAMP and knife edge are used to check the curve of the mirror as it approaches a parabola. Constant testing is most important to avoid getting too deep a curve. Photograph above shows the parts of the mounting.

kind of surface which will reflect light from infinity to a single point. All other curves—the ellipse, the sphere, the hyperboloid—bring rays to a focus at more than one point and so yield a fuzzy and degraded image.

Testing For A Paraboloid

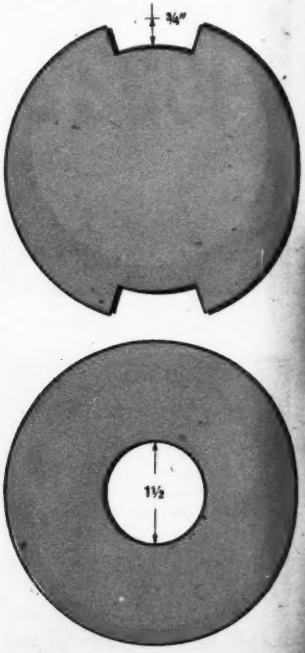
So, how can you be sure that you are polishing a paraboloid? Easy enough. You can test your mirror by means of a very simple rig invented by a French physicist called Leon Foucalt. (Foucalt was a man who also demonstrated visually to Parisians the turning of the earth on its axis.)

The method of testing a mirror to see whether or not it is a paraboloid is known as the Foucalt knife-edge or shadow test. You will need a pin-point source of light which can consist of a five- or ten-watt candelabra base lamp mounted on a block of wood and then inserted in a cardboard tube as shown in the photograph.

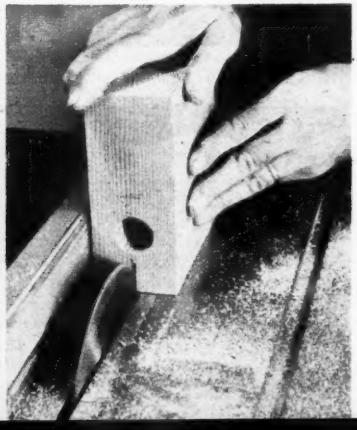
Insert the electric lamp in the cardboard tube and punch a half-inch hole opposite the lamp. Paste a piece of tinfoil over the hole and perforate the tinfoil with a needle. You now have a pin-point source of light.

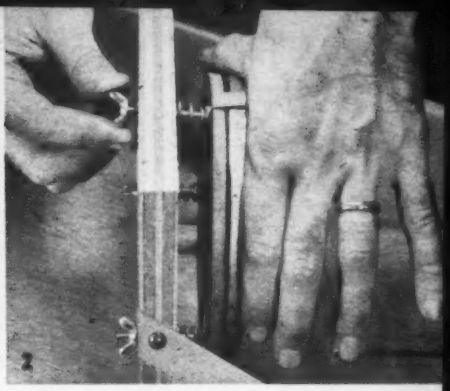
Place the partially-polished mirror on a firm spot and then set the knife-edge and the lamp at the center of curvature,

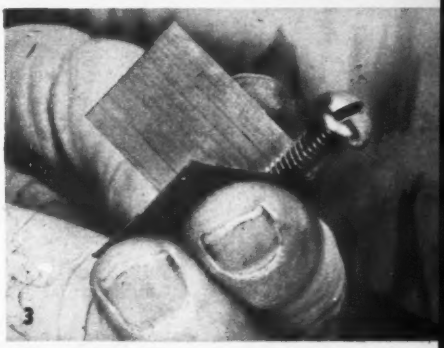
TWO MASKS at right are used to check parabolization of the mirror. Top mask checks outer zone, lower mask measures curvature in center area. Masks are six inches wide.



TO MAKE the bearing block for mounting, cut it to the size shown in the drawing, bore a 1 3/32-in. hole two inches from edge. Then cut a slot about four in. deep as shown below.



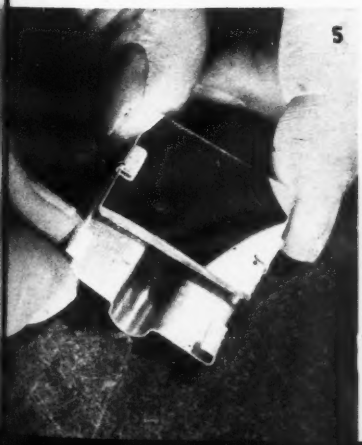


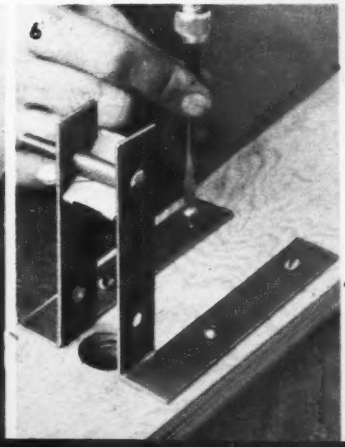


1. To determine the focal length of your mirror, point it at the sun. The point at which you get the sharpest possible image of the reflected sun on a business card, is the exact focal length. 2. Cell for mirror has three spring-loaded wing nuts which align mirror to the diagonal. 3. Holder for diagonal is formed by first bending strip of sheet brass around a bolt as shown. 4. Then hammer it flat in a vise. 5. Four clips hold the small mirror in place. 6. How the diagonal holder is fastened to the main mounting. 7. Bearing block fastened to mounting. Wing nut adjusts tension.

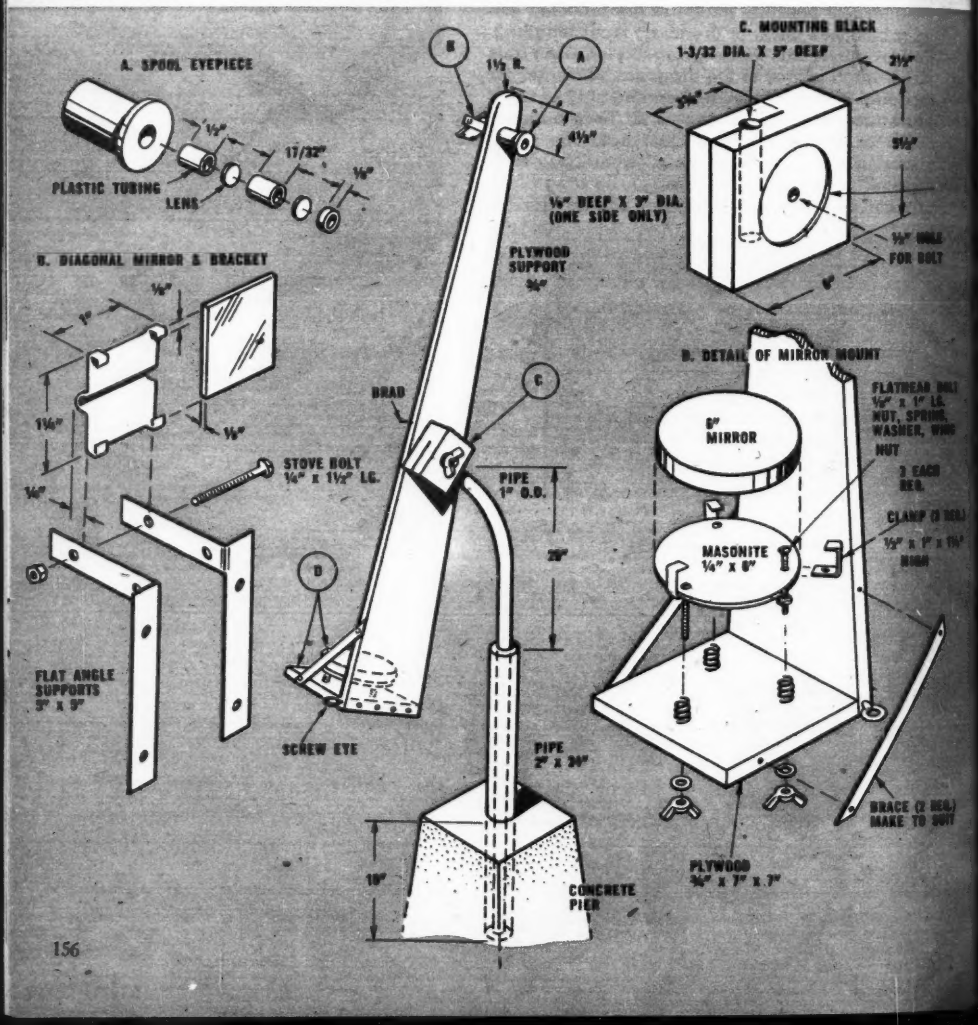
PLANS AVAILABLE

A complete set of plans describing the construction of this telescope, including silvering, will be available to our readers. To reserve your copy, send $2 to Mechanix Illustrated Plans Service, Greenwich, Conn. Ask for Plan No. 8, Ten-Dollar Telescope.





BENDING THE PIPE for mounting. The angle should be equal to the latitude of your home. The concrete pier holding the large pipe should extend below frost line to prevent heaving.



CEMENT the smaller pipe as shown so that it faces true North, not magnetic.

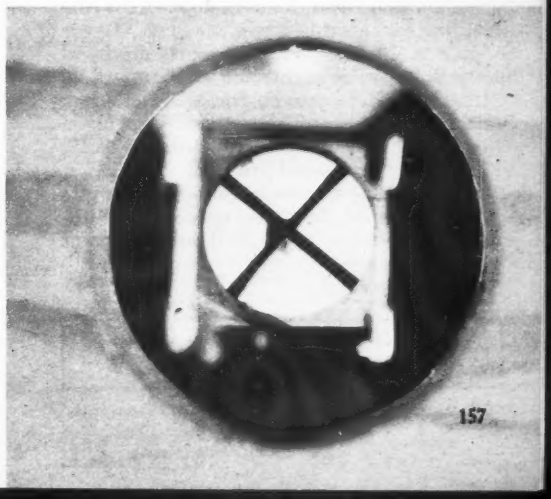
COMPLETED TELESCOPE on mounting with mirror in place. Moon can be observed without silvering.

which should be about eight feet or so from the mirror. The center or radius of curvature is always equal to *twice* the focal length. What you are trying to do is reflect the pin-point of light from the mirror to the knife-edge.

Inasmuch as it will be quite hard to pick up the pin-point of light, it is best to take the sleeve off the lamp and explore the area with a piece of ground glass. Put your eye close to the lamp and move back and forth and up and down until you suddenly see the reflected image of the lamp. This is a real image which appears to be suspended in the air. If you take the piece of ground glass and place it near your eye, you will see the image of the lamp thrown on the ground glass just as though you were using a camera.

Shim up the mirror or twist it slightly from side to side in order to bring the reflected light to a convenient point of viewing. A convenient point is at eye level when your chin is at the edge of the test bench. After the image of the lamp has been picked up, cover the lamp with the sleeve so that the pin-hole faces the mirror. This may disturb the setting somewhat and you may have to explore the area again until the pin-point of light is again picked up.

Since you will have to repeat this step many times during the stages of polishing, it is best to make some sort of reference mark on the table where the mirror is standing so that you can always place the mirror in the same position for each suc- [*Continued on page* 162]



WHAT YOU SHOULD SEE when aligning mirror, diagonal and eyepiece holder. Stretch black strings over the mirror. Adjust the mirror by means of the wing nuts so that strings cross the center of diagonal. This is the view you will see through the eyepiece adapter with the spool eyepiece removed.

All About Spark Plugs

[*Continued from page* 147]

speeds the plugs would normally show white or yellowish deposits caused by leaded gas. Cleaning is sufficient here.

Setting the Gap

After they are clean and dry, use a spark plug gapping tool to adjust the gap. This tool can be bought at a nominal price from an automotive supply store and will make the job a lot easier. It incorporates a small file for cleaning the electrodes, slots for checking gaskets and bending blades.

Incidentally, don't overlook the gaskets on those plugs which use them. On some of the newer car models the plugs have tapered seats instead of gaskets which help to eliminate many of the headaches of removing and installing spark plugs.

Check your owner's manual for the correct spark plug gap setting and adhere to it closely. The wire gauge should slide through smoothly, not too loose and yet not a forced fit.

One final check before replacing the air cleaner: start the (cold) engine and see that the automatic choke works properly. A defective choke is a real gas robber. If your choke operation is sluggish or sticky, have it repaired by a skilled mechanic.

Cleaned, properly gapped plugs should be checked at a shop where they have a comparison tester. This pits your plugs against new ones and will save you trouble and disappointment if any of them turn out to be duds.

Use a torque wrench for the final installation of the old or the new set of plugs, being careful not to distort the plug shell, which would adversely affect the electrode's gap.

For a 10mm plug, 12 foot-pounds of torque is about right; for a 14mm plug, pull to 25 foot-pounds; for a 16mm plug, 35 foot-pounds. This is for cast iron heads. For aluminum heads torque to 10, 22 and 25 foot-pounds respectively.

Chances are you've spent less than one hour on the whole tune-up and you'll undoubtedly notice a decided improvement in performance.

Happy driving!

When answering advertisements please mention
MECHANIX ILLUSTRATED

Down The Drain

[*Continued from page* 118]

preference. In any case, the basic mechanisms of both are the same.

"Should I Buy One?"

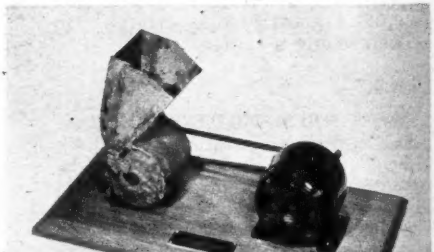
Should you buy a disposer at all? The answer is "yes" if it will save you enough work to justify its price (which will list from $50 to $100) and, most important, if you live in a community where disposers can be legally installed.

Several cities and towns have local codes prohibiting the installation and use of disposers. The reasoning of sanitation men in these locales is that already overloaded sewage systems would be strained to the limit if disposers were in use in many houses. If you live anywhere in New York City, for example, you cannot have a disposer. If you live in the states of New York, New Jersey, Pennsylvania, or Florida, better check with the local sanitation people and find out what the law says.

A number of cities that have previously outlawed disposers have in recent years changed their minds. The most recent to do so was Chicago. Other large cities where disposers are legal are San Francisco, Los Angeles, Houston, Cleveland, and Washington, D. C.

On the other hand, if you live in Detroit, St. Paul, or Pomona and are building a new house, you *must* have a disposer installed. In the communities of Jasper, Ind., Shorewood, Wis., South Euclid, Ohio, and

FIRST DISPOSER was invented in 1927 by John Hammes, founder of In-Sink-Erator Co.



Down The Drain

[*Continued from page* 158]

Mt. Dora, Fla., every home, new and old, is required by law to have a garbage disposer.

The best logic to use in deciding whether or not to purchase a disposer is to balance its cost against the amount of garbage which must be disposed. One pound or more per person per day is the average daily accumulation. Certainly Any quantity above one pound per person per day will go a long way towards justifying the price of a disposal unit.

Installation

Before installing any garbage disposer make sure there is room enough for it under the kitchen sink. The average disposer is about 12 inches high with a seven-inch diameter.

If you are a good amateur plumber you can probably put in your own disposer. First mount a special flange in the sink drain opening and seal it with non-hardening mastic. A supporting ring is screwed to the under-the-sink end of the flange and the disposer is then secured to this with studs or a bayonet-type mount.

Next, connect the disposer drain pipe to the sink's drain pipe and trap. This will require some cutting and, in the case of mismatched pipe sizes, adapters may be necessary. Slip joint connections should be used to join the pipes.

Now you are ready to make the electrical hookup using BX cable. One lead is brought out from the nearest junction box to the disposer. The return lead from the disposer goes to a single-pole, single-throw wall switch and back to the return side of the junction box—and that's all there is to it.

Disposers And Septic Tanks

A question often asked by prospective disposer buyers is: Can they be used with septic tanks? The answer to this is a qualified "yes."

Tests show that a disposer will in no way harm a septic tank; that is to say it won't interfere with the bacteriological action that goes on inside a septic tank. However, you may need a larger tank than you now have or you may have to clean out your present tank more often if a disposer is installed. If you have a cesspool, however, a garbage disposer is out of the question.

Trouble Shooting

The most common ailment of garbage disposers is a jammed impeller. This is very often the result of someone carelessly dropping a hard, nondisposable object into the unit. If the object is small enough it will wedge itself between impeller and shredder ring.

When this happens turn the disposer motor off. If the culprit is a piece of silverware, chances are you will be able to reach it with your fingers or a pair of long-nosed pliers. If it's something smaller, try working it loose by flipping the motor's switch on and off rapidly. If these remedies fail you will probably have to take the unit apart to find the trouble.

Occasionally a disposer will stall or simply refuse to grind up anything even though it seems to be running perfectly. Usually this is the result of overpacking.

Other troubles are often attributable to a homeowner's failure to check such things as fuses before he puts in a panic call to the serviceman. If your disposer stops operating because of an overload, don't forget to reset the overload relay before tearing your hair out.

Sometime leaks occur around the top of the unit. When this happens, check to see if the mounting screws have worked loose. A thin gasket and a little caulking compound will help in this case. After long wear the sink mounting gasket that comes with the unit may develop a leak and will have to be replaced.

All garbage disposal units are self-cleaning devices—which calls for a word of caution: never, but never dump any drain cleaning chemicals down the disposer. The corrosive action of these cleaners will definitely damage the working parts of any disposer. You can always flush out the unit by filling it with water—leaving out the garbage—and allowing it to run for a minute or so.

When answering advertisements please mention
MECHANIX ILLUSTRATED

The Stanley Steamer

[*Continued from page* 124]

indicated. A good method of shaping is to cut a forming block to the inside dimensions, then fasten the trimmed sheet to the block with C-clamps. Hammer the flanges to shape and file smooth.

Both axles are fashioned from quarter-inch diagonal stock with ⅛-inch diameter turn-downs for receiving the wheels. Make the required fittings and linkages as indicated in the drawing. The kingpin cage is a U-shaped piece of sheet with the kingpins pivoting in both upper and lower holes. Press-fit the cage to the front axle and solder. Complete the kingpin assembly, one right and one left, then force them into the cage.

With these components completed, a major assembly can now be made. Solder the mounting pads in position on the springs and solder the spring assembly to the underside of the floor. Check for proper positioning and parallelism. *Clean all areas to be soldered with medium grade emery cloth.* Fasten the spring reinforcing bar to the springs, using $\frac{3}{16}$-inch diameter stock, then solder the front and rear axles in their proper positions. Solder the reinforcing bar and axles at the same time. You now have the chassis completed.

The wheel assemblies should be next. Disks of brass $\frac{9}{16}$-inch thick by 3½ inches in diameter are used, shaped as called out in the wheel cross sections. The hubs are machined from ¾-inch diameter stock to their given diameter and thicknesses. Twelve ⅛-inch diameter spokes support the rim of each wheel. A jig will help to drill all the holes in the wheel rims and hubs. A ⅛-inch diameter hole will permit a slip fit for the spokes and ease assembly of the wheel. A word of caution: before soldering the above components into an assembly, be sure the wheels track and turn correctly. To solder, brush on a paste solder to all joints, then hold over the flame of a gas range until it flows. Dunk into cold water to loosen the flux. This dunking is a good procedure to follow after each assembly.

Fashion the body sides and formers, including the firewall, from 1/32-inch sheet brass. In soldering, start from the rear former and work forward. The cowl flaps are shaped over the firewall contour; solder them at the center line. Remove all rough edges by filing and polishing, then fit the body on to the box. The body should rest flat with no rocking. Solder the body in place only after the steering column and running boards are fastened.

Front and rear fenders and the running board are all made in one piece. The drawing shows the "bend" line and the shape and position of this unit. There are four braces that support this member to the floor box. They are bent from 3/32-inch diameter or, $\frac{1}{16}$-inch diameter rod. Before fastening the fenders, solder the splash guard to the inside front fender. File the rough, extended edges. As work proceeds, wipe the flux from each soldered joint.

Steering

The steering mechanism is a simple machined unit. Both ends of the ¼-inch tube column are bushed to receive the $\frac{3}{16}$-inch diameter steering rod. Mark off the hole through which the column will enter the floor. Drill and file until the column is at the proper angle and then solder. Construct the steering wheel from ⅛-inch rod, rolling the rim on a suitable piece of round stock. Before soldering, complete the hub and spokes, then solder the three units at the same time. Press the $\frac{3}{16}$-inch diameter steering rod into the wheel hub. Insert this assembly into the column. Then fasten the steering pin to the bottom of the steering rod. The steering pin slips into the cage fastened to the tie rod, which in turn is fastened and turns on the kingpin linkage. All this actuates the front wheels. With proper fit, a 40-inch turning radius can be achieved.

The balance of sheet metal work is centered around the seats and hood, both comparatively simple. When the seats and back are shaped, roll the radius which forms the back on a half-inch diameter rod, then fit into the seats. Solder and file smooth. Fasten these two assemblies in place on top of the body shell. There is no special technique involved, just careful fitting and soldering.

In designing the hood for modeling, we hit upon a simple procedure. The lower half of the hood is 1/32-inch sheet brass,

The Stanley Steamer

shaped as shown. On top of this, solder the quarter-inch square horseshoe fitting. Top this off with a sheet of brass and there you have it. The chamfer is achieved by filing. Sand and polish until all nicks and dents are removed.

The car is now sufficiently completed to slip into the final stages of assembly. With regard to finish, most any color scheme will do. The plans indicate suggested colors. The body and floor box and all braces are painted green; red for the underside of the fenders and running boards. Use black for glass on the cowl, headlamps, bulb, tubing and horn, plus the steering column and, of course, the tires. The hood, wheels, topside of the fenders, running boards, lamps and carbide generator are natural brass. The underside of the car is yellow.

In the cross section of the wheels you will note that the rims are flat. This is to accommodate a press fit of the tires. The tires themselves are machined from Micarta or Lucite, then painted black.

Upholstery

Prior to working out the upholstery, all details should be completed and fastened to the car—lamps, generator, horn, hub caps, etc., plus the paint job. Fine painting, polished brass, and good workmanship are most important for a good show. However, a detail such as poor upholstery will certainly spoil the appearance. Considerable thought went into the make-up of the upholstery. The result is a simple project with a most effective result.

Cut the seats and back, to the shape indicated on the plans, out of heavy cardboard. Cement to this the ⅜-inch thick cotton cushion interior. When dried, trim the cotton to match the cardboard backing. The actual covering is a thin red oilcloth or plastic. Shape the cloth a half-inch wider than the back and seats to which it is to be fastened. Starting with the straight edges, cement the overhang for a better fit. The method is simple, the results excellent. The pillow pattern is achieved by passing red thread into the cloth and pulling taut. When satisfied with the results, cement the pads to the painted seats with Duco cement. Use spring-loaded clothes pins to hold the back in place while drying. •

The Screw Driver

[*Continued from page* 128]

cross slots that taper down to a deep recess at the center. The screw driver tip is shaped like a beveled cross and is pressed down into the screw slots. The advantage of this screw driver is that it won't slip if the correct size is used.

For ordinary use almost any screw driver will stand up fairly well. But once the stress is on, defects of poor quality will show up. Examine the blades to check whether the tips are polished, carefully machine ground and truly square across the edges. Good-quality blades are forged and properly heat tempered. Handles should be smooth and shaped for comfortable gripping. Amber-colored plastic handles (acrylic) must be rated slow-burning.

Special Screw Driver Types

Reed & Prince screws have come to be used widely in radio, television and electrical appliance fields. The screwheads show cross slots at the center which do not extend all the way across the heads and require this special screw driver.

Clutch Head screws are used mostly for sheet metal fastening, particularly on car and truck bodies. The screws have a center indentation shaped like a dumbbell, and take a special type screw driver.

Non-Sparking screw drivers, made of beryllium-copper alloy, are designed for use where fumes present the hazard of explosion from sparks. The drivers are non-magnetic and have plastic handles rated as breakproof and shockproof.

Screw Driver Bit: Used with a rotary brace for added leverage and to speed turning. Holes in the work should be predrilled so screws start easily and run in straight.

Screw-Holding Screw Driver: This is particularly valuable where a screw turns into a hard-to-reach place. One type consists of a two-piece spring clip which is pushed down below the screw driver tip to grip the screwhead. Magnetic screw drivers also are available for this purpose.

Flexible Shaft: When the going's rough you can depend on a flexible shaft screw driver to reach anything anywhere.

Magazine Screw Drivers: A single (hol-

[*Continued on page* 189]

A Ten-Dollar Telescope

[*Continued from page* 157]

AIMING THE TELESCOPE. It is very difficult to pick up a particular star without sights.

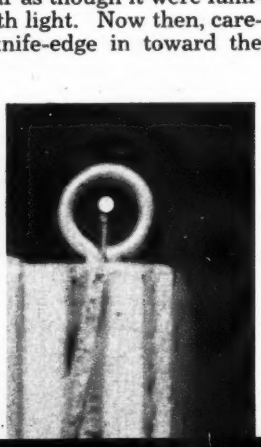
ceeding test. It is also a good idea to note where the image of the lamp is reflected to the opposite corner of the room or wall with the cover off the lamp stand. This way you can always replace the mirror so that the reflected image always hits the same spot. Then when you replace the sleeve you will be reasonably certain that the pin-point of light is where you expect it to be.

Now for the actual test. As the pin-point of light leaves the lamp, hits the mirror and comes back to enter the eye, the mirror will appear as though it were luminous, glowing with light. Now then, carefully slide the knife-edge in toward the right (toward the lamp). Do this very slowly and carefully. As you do so a vertical shadow will appear to cross the face of the mirror. This shadow will move from left to right (the same way that you are moving the knife-edge) *if the knife-edge is before the radius of curvature.* If you move the knife-edge back an inch or two so that you are beyond the radius of curvature, the shadow will appear to move in the opposite direction. In other words, from right to left. At this point we are beyond the radius of curvature. As the artillerists put it, "We have bracketed the target."

Move the knife-edge to and fro until at a certain point you will notice the mirror darkens evenly all over as shown in the lower left drawing on page 153. At this point if you have a perfect sphere there should be no apparent movement of the shadow. You are looking at the shadowgraph of a true spherical concave surface.

You can consider the rays of light going from the pin-hole and coming back from the mirror as giant fingers or radii. From plane geometry you know that all parts of a sphere are equally distant from the center. Therefore, if you cut off half the light from the center, you are losing half the illumination. If you have a sphere then, it will seem to darken evenly all over. At this point, you could probably go ahead and use the mirror. But if you want perfection you must polish the mirror so that it is a paraboloid—for a paraboloid, as we said before, reflects all light from infinity to a single point.

WHAT you will see when you line up the sights on the moon. Then look through the eyepiece.



Parabolizing

To parabolize the sphere you will have to deepen the center a few millionths of an inch. This sounds quite terrifying but actually it is quite easy.

Cut out two cardboard masks as shown, each six inches in diameter. One mask should have a hole in the center 1½ inches in diameter. The other mask should have two pieces, cut as shown, ¾ inches wide. With one mask you will determine the exact radius of curvature of the center zone; with the other mask, the radius of the outer area of the mirror. There should be a dif-

[*Continued on page* 164]

ARTICLE LIST NO. 1
Summaries of articles reprinted from January 1958 MI

1. **Your Skills Are Worth Money.** How to profit from the nationwide skill shortage by learning a trade.
2. **Crickets Put Him In The Chips.** An enterprising Texan makes cricket-raising pay by selling breeders to anglers.
3. **McCahill Tests The '58 Pontiac.** Automotive expert describes his impressions of a popular American car.
4. **McCahill Tests The Swedish SAAB.** A report on the performance and design of a popular foreign automobile.
5. **Fun With Fossils.** Intriguing hobby of collecting evidence of life on earth ages ago is growing in popularity.
6. **The Miracle Of Shellac.** Fascinating facts about a tiny Indian bug that is the source of an everyday product.
7. **Handloading Made Easy.** Shooters save money and get more accurate hits by reloading used cartridge cases.
8. **Arrow In The Sky.** Rocket expert tells how modern missile designers use ancient arrow shape in aerodynamics.
9. **The Hammer.** Short history of man's oldest hand tool with descriptions of special types and how to use them.
10. **Dining Room Set.** Detailed instructions for constructing chairs and an ingenious table in your workshop.
11. **Midget Hi-Fi Speaker.** How to build a small cabinet for an economical sound system for your hi-fi set.
12. **"It's My Book."** You can make your own bookplates by carving designs on a simple linoleum block.
13. **Turn On The Heat.** A clever new product helps your car heater warm up fast: tips on aiding heater efficiency.
14. **Little Fellow.** Californian builds a fast, boy-size speedboat for his youngster and launches a new hobby.
15. **Photographing Sputnik.** How amateurs can take pictures of the famed satellite and its rocket.

ARTICLE LIST NO. 2
Summaries of articles reprinted from February 1958 MI

1. **A Cure For The Common Cold?** Science makes a breakthrough in the war against man's ancient ailment.
2. **Manned Space Scouts.** Two experts envision a spaceship which could thwart attacks by hostile satellites.
3. **Hunting Treasure With Underwater TV.** Specially-built television cameras help divers salvage sunken ships.
4. **McCahill Tests The New Mercury.** Automotive writer describes the 1958 model of a famous car.
5. **How To Drive The Turnpikes Safely.** Tom McCahill's advice on the right way to handle a car on super-roads.
6. **How To Clean Up In Business.** New company is founded on a formula for a unique do-it-yourself rug cleaner.
7. **Did You Marry The Right Girl?** Researchers find many hallowed beliefs about marriage just aren't true.
8. **Small Foreign Cars.** Facts the automobile fancier should know about the popular little models from abroad.
9. **All About Casters.** Ingenious ways to use wheeled helpers for moving awkward or heavy objects.
10. **Build This Model Of The USS Forrestal.** Detailed plans tell you how to create the carrier in miniature.
11. **Heavy Duty Workbench.** Complete instructions for building your shop's most important piece of equipment.
12. **Transistor Radio.** You can build your own portable radio by assembling a simple electronic kit.
13. **"Stop Killing Your Car!"** An expert tells how intelligent care will make your automobile last longer.
14. **A Ten-Dollar Telescope.** Step-by-step plans for constructing a remarkable 200-power peephole to the heavens.
15. **The Saw.** Our most efficient cutting tool comes in a score of different types; how to choose and use them.

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A Ten-Dollar Telescope

[*Continued from page* 162]

ference of about 1/10 inch between the two zones.

How do we get this 1/10 inch? It's procured by means of a simple optical formula:

$$\frac{r^2}{R} \text{ or } \frac{3^2}{96} = \frac{9}{96} = .093 \text{ inch}$$

Small r is the radius of the mirror and large R, the radius of curvature.

In other words, if you get the inner zone of the mirror longer in radius than the outer zone by roughly 1/10 of an inch, you have achieved parabolization. This difference is a minute one because we are dealing with two optical surfaces, a sphere and a paraboloid, whose curves lie so close to each other that they actually touch at certain points.

Place mask No. 1 (the one with the outer cut-outs) over the mirror and carefully determine where the outer portion of the mirror seems to darken evenly all over. Move the knife-edge in very carefully as you conduct this test. At the point where even darkening seems to occur, draw a pencil line at the bottom of the knife-edge or the base to which it is attached. Then, with mask No. 2, make the same test on the central area of the mirror. You will find that you will have to push the knife-edge closer to the mirror in order to get the central area to darken uniformly. This is so because the central area has a shorter radius of curvature.

If you remove the masks and test the mirror as is, at the mid-point, you should get a shadowgraph of a paraboloid. It looks somewhat like a doughnut. We have tried our best to reproduce it at the bottom of page 153. We have deliberately exaggerated the light and dark area. Actually the shadows are much more delicate. The important thing to remember is that one shadow will be coming in from the right toward the left (central zone) and another shadow will be coming in from the left toward the right (outer zone).

Parabolization should only be attempted after the mirror has been completely polished and shows a true spherical curve. If you are satisfied that your mirror is free of all pits, probably after at least eight hours of polishing, and that your mirror turn is a true sphere, you are then ready to parabolize.

There are several methods of parabolizing a spherical mirror. The easiest one for the amateur is by means of a long stroke. To parabolize, lengthen your stroke from two to three inches. This has the effect of deepening the central area of the mirror.

How long should you "parabolize"? Use a long stroke for five minutes and then test. Parabolization can occur quite rapidly and if you use too long a stroke for too long a time you will probably find that you have overshot the mark. If you do, use the same technique that you did to correct over-grinding. In other words, place the mirror on the barrel head and polish with the tool on top.

Parabolization is the most arduous and exacting task in mirror making. *Go slowly, test frequently and keep a record of what the shadows look like.*

Now then, let us assume that you have completely polished and parabolized your mirror. At this point you are probably very anxious to try it out. To do this we have designed a rather simple mounting which will enable you to observe the moon and stars. The mirror can be used for observation of the moon without silvering or aluminizing.

The Mounting

The mounting consists of a ¾-inch plywood board, cut as shown, secured to a steel pipe which in turn is buried in a concrete pier. Before starting work on the mounting, determine the *exact* focal length of the mirror. (Do this by mounting the mirror temporarily on the mounting.) Point the mirror at the sun and place a business card in front of the mirror so that the shadow falls on the mirror. Move the card back and forth until at a certain point you get a bright, hot image of the sun. Get it as sharp as possible. Mark the spot. The distance from this mark to the center of the mirror is the exact *focal length* of your mirror.

The next step is to make the cell. Follow the details in the drawing on page 156. The three spring-loaded wing nuts are used

[*Continued on page* 191]

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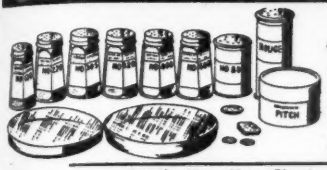
SPECIAL! SPECIAL!

Complete Optical Kit for Building 6" Reflecting Telescope



Consists of plate glass mirror blank; tool; 2 finely ground and polished lenses to make ½" F.L. eyepiece; first surface diagonal mirror; magnifying lens; 8 assorted abrasives from coarse to fine, in shaker-top containers; tempered burgundy pitch.

Stock No. 70,154-B .....$9.00 Postpaid

DELUXE KIT
for this project
Same items shown at left, but contains Pyrex mirror blank—1" eyepiece lenses.
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3" ASTRONOMICAL REFLECTING TELESCOPE
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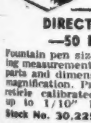

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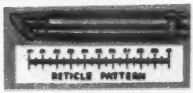

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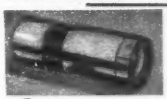

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By G. Harry Stine

ST. BARBARA'S COMPOUNDS

THE pagan father of St. Barbara was said to have been killed by lightning as a punishment after beheading his Christian daughter. And so St. Barbara has come to be the patron saint of people in danger from lightning and fire—including artillerymen and all those who work with high explosives. That includes men who work with rocket propellants. Especially solid propellants.

Up until 20 years ago, solid propellant rockets used ordinary gun propellants such as blackpowder. About that time, ballistite was first used as a rocket propellant. Ballistite was the second successful smokeless powder discovered, and was invented by Alfred Nobel in 1888. It is a stiff gelatinous mixture of nitroglycerine and soluble nitrocellulose or guncotton. It was the first of the modern double-based solid rocket propellants. It is also an excellent high explosive.

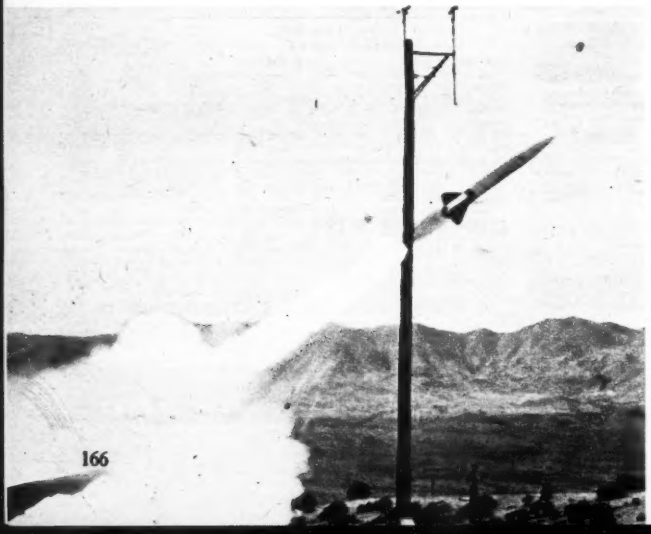
Most standard double-based rocket propellants contain nitroglycerine and nitrocellulose plus some small amounts of various other materials to increase the stability of the propellant (help it to hold its shape and to improve its burning properties).

Blackpowder is an extremely stable rocket propellant, being shock insensitive and requiring direct application of flame to ignite it if its temperature is below the 550° required for spontaneous ignition. But it has poor physical characteristics since it is brittle and susceptible to cracking—a disastrous thing for a solid propellant. The double-based propellants, on the other hand, usually have good physical characteristics but, after they've been stored a while, slowly give off oxides of nitrogen which help the decomposition of the propellant.

This decomposition can produce enough heat to ignite the propellant. That's lethal. Therefore, stabilizers such as ethyl centralite, methyl centralite, or diphenylamine, which can react with the liberated oxides and render them ineffective, are added to double-based propellants.

Plasticizers of various sorts are also used to act as stabilizing agents, shape-holding agents, or a combination of both. Two common plasticizing agents are rubber and asphalt.

The use of rubber and asphalt in solid rocket propellants also means that these things can, if required, serve as part of the solid charge itself as burning agents. This is a fairly recent development stemming from research carried out at the California Institute of Technology during World War II. The result was a new type of solid propellant you no doubt have



LITTLE JOHN rocket, a U. S. Army Ordnance missile powered by a modern solid propellant, blasts off at White Sands Proving Ground.

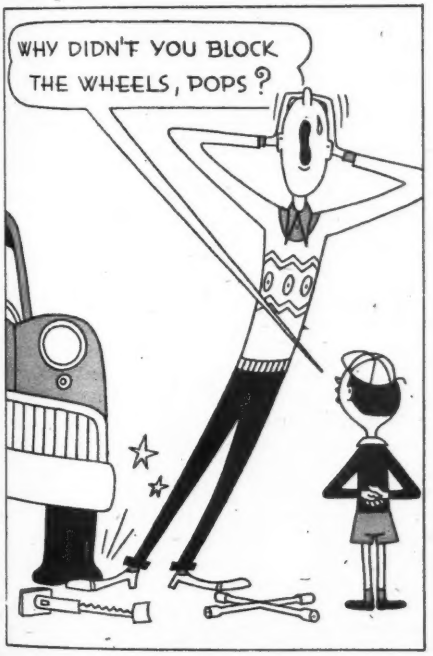
heard of before. It's called JATO.

New types of solid propellants are coming along now which are extremely powerful and also highly classified. They are so good, as a matter of fact, that they are threatening the high-performance niche previously held by the liquid propellant rocket. The U. S. Navy's Polaris missile, a ship-launched IRBM, is reported to be a solid propellant unit. This should give some indication of how "hot" these new propellants are!

But, regardless of type, solid rocket propellants are basically high explosives. Handled properly and with due respect, they are quite safe. Explosives are made to explode and generate gas; this they will do under certain conditions; these conditions vary from compound to compound. Past experience has shown us how to handle and store them and extensive training is given to rocket people who must work with solid propellants.

Quite often, however, there is "one big, cotton-picking explosion," as one rocket man put it. It is during these times that rocket men, when they pray, often invoke the patron saint of all those who work with high explosives. St. Barbara. •

DON'T DO-ITS



HELP WANTED!

A special MI public service feature

Company: Revell, Inc., 4223 Glencoe Ave., Venice, Calif.

Products: The company specializes in plastic scale model kits (planes, cars, ships, etc.) and HO gauge electric trains, sold in stores and hobby shops throughout the world.

History and size: Revell was founded in 1941 by Lewis H. Glaser (now president) and is considered the largest producer of plastic hobby merchandise. Volume of business last year was approximately $35,000,000. Company employs about 1,000 people in plants at Venice and at South Plainfield, N. J.

Jobs available: Openings for plastics engineers and for experienced personnel to serve as research & development manager, eastern sales manager and national sales manager.

Location: The main plant at Venice is a few miles from the heart of Los Angeles and the South Plainfield plant is about 40 miles from New York City. There are three foreign plants—in Mexico City, London and Lockhausen-Lippe, Germany. Plastics engineers may be assigned to any of the plants; research & development and national sales managers would be based at Venice and the eastern sales manager in his territory.

Salary: Managerial positions pay "well up in the five-figure bracket." Salaries for plastics engineers are based on background and experience.

Requirements: BS or MS degree preferred but not absolutely essential. The most important qualifications are intelligence and imagination, "plus the initiative and ability to fit into a progressive and highly participative managerial set-up."

Additional benefits: Revell has profit-sharing and bonus plans; extends tuition aid for advanced courses at colleges near its plants, encourages participation in seminars.

For further information: Write to Mr. Dan Harris, Employee Relations Manager, Dept. M, Revell, Inc., 4223 Glencoe Ave., Venice, Calif.

Next month: Goodyear Tire & Rubber Co.

Scientist Shortage

[*Continued from page* 61]

Perhaps you may have noticed that nowhere in my bill is the sex of acceptable Cadets mentioned. That was deliberate. I believe the academy should be co-educational. I realize this may arouse some opposition to the bill; I hope not, for we have neglected too long the vast, untapped potential of scientific contributions from American women.

It has been estimated that at some Russian atomic projects, as many as half the scientists are women. In this country we have a handful of women scientists in good jobs. Our Science Academy might very well attract such brilliant Cadets as Joyce Myron, the 18-year-old student from the Drexel Institute of Technology, who dazzled millions of Americans when she displayed a staggering knowledge of atomic energy on TV's "$64,000 Question."

What will the United States Science Academy accomplish that other private technical schools and universities cannot?

In the first place, it will assure our armed forces of a definite, reliable and steady number of highly trained scientist-officers. We must remember that graduates of private schools are under no compulsion whatsoever to join the armed forces. Just the opposite is usually true. We have to snare many of them through the draft, if and when we can. We even have difficulties obtaining them as civilians attached to the armed forces because we cannot pay the high salaries of private industry.

On the other hand, the incentive for becoming a Science Cadet is quite strong. The Cadet will not only get a free education, but he will get paid for it. He will be free to devote all his time and energies to his first love, science, and not to waiting on tables or jerking sodas in order to pay his tuition, room and board.

Although it has been estimated that some 40 per cent of our top high school graduates never go on to college because they cannot afford it, money will not stand in the way of recruiting a Science Cadet for Uncle Sam.

One reason America is graduating only half the number of science students as Russia, say the experts, is the fact that scientists in America lack public respect and prestige. Says Dr. Edward Teller, noted "father" of the hydrogen bomb: "In Russia, a boy thinks about a career as a scientist, the way a young girl in our society thinks about becoming a movie star."

The United States Science Academy should prove a glittering attraction for young Americans, and should do much toward restoring the tarnished prestige of scientists in this country. The Science Cadet will enjoy the prestige and dignity that comes with graduation from West Point or Annapolis.

I first began to give serious thought to the problem of training scientists for our armed forces back in 1955 and 1956 when, as a member of the NATO Parliamentary Conference, I attended secret briefings by Generals Gruenther and Norstad. I came away from these meetings considerably disturbed by the news that Russia was drawing ahead of us in the science race.

I thought about the nation getting such great military leadership from West Point and Annapolis—then why not the same for the world of science from a U.S. Science Academy? When our own complacency was shattered by the Sputniks, I decided the time had come to act.

I am confident that adding a Science Academy as this nation's fourth defense bastion will add greatly to our national soundness and strength.

Whether you agree or disagree with the idea of a Science Academy, it is at least worthy of public discussion and debate in Congress, and I am sure your representative would be pleased to have your views and suggestions—and so would I. •

Plane Lands At 5 MPH!

[*Continued from page* 83]

expected to be sold for about $90,000.

The smaller CCW-2 will have a single 240-hp engine. It is designed for town and country use and for commuters who will be able to land and take off in it from their backyards. It will be able to get off the ground and land at *five mph* in less space than its own 18-ft. length, climb at 4,000 ft. per minute and achieve a flying speed in the 200-mph class.

The wings for the single-engine production model are similar in design to

those on the twin-engine machine, except that they are shorter and squarer at the wing tips and, of course, have only a single channel. CCW-2 won't have the conventional fuselage and tail assembly of the two-motored CCW-5. It will use twin, stainless steel frames. These will run back from the wing on either side of the cockpit to support the twin tails.

The introductory price on the CCW-2 will be about $15,000 says Custer. However, he plans to bring it down to about $4,500 or lower as soon as increased production makes this possible.

Company officials say that plans are also afoot for a channel-wing aircraft-auto that can rise from or land on any road or parking lot. Once it has landed, the wings will automatically fold down at the sides to a width of less than eight ft. The propeller shaft will be disengaged and the aircraft will become an auto, able to go from flight to highway use without interruption of its forward motion. It will also be able to make helicopter-like landings on roofs.

The development of Custer's unique channel-wing aircraft has been watched closely by civilian and military groups and several foreign governments have shown a great interest in it.

Who knows? Someday you may land in your own backyard and park your carplane in the garage before you kiss your wife hello after a hard day at the office. •

McCahill's Touring Tips

[*Continued from page* 93]

Otherwise, that trip to see what's on the other side of a tree could very well be your last. And finally, a tow cable could be worth it's weight in gold in case you get stuck in sand or mud or have an engine blow-up like I once did in the desert.

Summing up, it's still practical to travel any time of the year by car without too much trouble but you have to be smarter than you used to be. If you find the roads jammed, take another route. Be sure to fuel up just before you stop for the night, as many gas stations don't open until seven or eight o'clock in the morning. In some sections, if it's a Sunday, they won't open up at all. If everyone makes a dawn start, you might even try driving at night to avoid them. Follow these tips and we'll guarantee you'll be a happy tourer or a more satisfied traveler. •

McCahill Tests Chryslers

[*Continued from page* 89]

except for some bad sidewall separation in the tires. What does this mean to you, as a buyer? It means that these Chrysler cars are as rugged as a drill sergeant's diary. If the average driver ever submits his own car to the punishment we put these cars through, he deserves to have his bust placed in the Looney Bin of Fame.

You'll have to look hard to find the car that will outdrag the New Yorker. It can do 0-60 mph at under nine seconds; clock 125 mph-plus on the flat when tuned correctly, and carry yourself, the two kids, the wife and dog from coast to coast with no more effort than getting a Dixie Cup of beer at the local ginmill. The only beef I had with these cars—they were the stark models of the camp, with no luxury accessories—was that the seats were a little low. They would be much more comfortable with the power option seat. Interior size was not of ballroom proportions and, if you haven't been watching your calories, exiting from the rear seats of the four-door models might get just a bit touchy, as they used to say at Bryn Mawr.

No one yet has made the perfect car but, this New Yorker is a helluva vehicle. No car will take a harder beating; the brakes are good, and when it comes to the handling department and roadability the Chrysler boys can shove their chests way out to here and demand all the medals.

Chrysler's full-time power steering, as we've written many times, is miles ahead of the competition and its roadability at high speeds is something only a guy who's driven every make can possibly appreciate. Driving one of its most highly-touted competitors (which I took over a test strip at better than 100 mph) was similar to holding down a 12-ft. whipping cobra with two hands while a horsefly lands on your nose. Immediately after driving this spook I drove the New Yorker over the same strip and found that at an even faster speed it was drilling down the strip like a bullet from a tournament rifle.

Before going on with this high-speed pitch, and before the safety preachers start stabbing me with letters, let me remind some readers that when a guy in Newark who has never been further than 100 miles

[*Continued on next page*]

from home writes, "What gives with all this speed—why stress it at all?", I write back, "There *is* more to America than Canarsie." In the East, our finest roads are undoubtedly such runways as the Indiana, Ohio and (in places) the Pennsylvania Turnpikes, where 65 mph is the speed limit.

West of the Mississippi there are thousands and thousands of miles of non-toll roads where it's safer to drive at 80 mph than it is on our turnpikes—and nearly everybody does. Just for fun I clocked a school bus, loaded with kids, doing 71 mph. It is possible, without any danger at all, to average a good five to ten miles per hour faster in the West than you can legally go on our Eastern turnpikes, for long stretches of five or six hundred miles. (This includes going through a number of small towns at the legal 35 mph.) With this New Yorker on one run I averaged better than 70 mph for several hours and was passed by dozens of cars, including a truck or two.

In summing up, if you're a man who wants to hit the highway with a big, powerful, capable piece of machinery that won't get nervous when you push it over 100 mph now and then, you'd have to go a long way to beat the Chryslers. Professional drivers will know what I mean; when you are really rolling, a fully-capable road car gives you the feeling that it's squatting down and grooving an unwavering path in any direction you put it. Some other cars under these same circumstances get as giddy as chorus boys at an eggnog marathon.

The late Walter P. Chrysler was a good personal friend of mine. If he were alive today he'd be proud of these 1958 offerings. And Walter P. was an automobile man from the wrenches up. •

All About Job Tests

[*Continued from page* 99]

Achievement tests are for trained men. You've learned a trade in school, or you've worked at it as a trainee for a while. The company wants to know just how well you can do the job; the achievement tests tell them. They measure specific skills and know-how.

Want a job as heater in a steel mill? "Okay," says our jolly tester, "just jot down the answers to the questions on this sheet." The questions ask where furnace checkers are located, how to tell if the stock gas is burning, and so on. There's no guessing here. You either know or you don't.

There are similar written tests for many different skilled jobs. And the testers have also come up with what they call "job samples." Often these are actual machines in miniature.

You're an expert punch press operator? The tester seats you at a miniature punch press. After you've finished, the tester—who has been clocking you—glances at a mechanical scorekeeper that's part of the machine. It tells him what you've done right and wrong.

The achievement tests are great for the man who knows his job. For example, you might have only a year or two of experience but you're sure you know as much as some men with ten years' experience behind them. The tests are your means of proving it.

Personality tests are designed to find out what the man inside you is really like.

You pore over a long, seemingly endless list of questions. Some are quite personal. Did you like your mother or your father best? Do you have trouble falling asleep? Would you rather read or watch TV? Do you ever think of suicide? What kind of girls do you prefer?

Or you may find yourself staring wide-eyed at a series of words followed by blank spaces. Like this: "Most women are . . ." Or. "Drinking is . . ." Or: "I worry . . ." Or: "Money . . ." In each case, you have to finish the sentence.

Or you may be asked to write true or false after a series of statements like: Someone is out to get me; I worry about microbes; The breaks always go against me; Elevators bother me.

What's going on? The answer is that psychologists have found that each man's personality adds up to a pattern. The questions, however idiotic they may seem, have been carefully selected and put to thousands of people. Your answers to all the questions establish the pattern of your personality. To a trained psychologist they tell a vivid story about you.

The more advanced tests have built-in "lie scores." The clever placing and wording of the questions are supposed to show

[*Continued on page* 172]

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[*Continued from page* 170]

up breaks in the consistency of your answers. And the newest of the personality tests allegedly have eliminated entirely the possibility of faking or lying. The projective tests, as they're called, have no "right" or "wrong" answers at all. They don't even have questions in the usual sense.

The tester hands you a picture. It is the first in a series of pictures in the Thematic Apperception Test, or TAT for short. It shows a boy looking at a violin on a table. "Make up a story about the boy," you're told. "What's he doing, what's he thinking?"

You have to answer, so you dream up a yarn. "This boy, see, he wants to play the violin. Strange thing, though, his folks don't want him to play. They say it's a lot of noise. But he knows that one day he'll be a great concert artist." And you go on and on. And you get asked a few questions about the boy and your story. Then you make up stories about scenes and people on the other cards in the series.

Let's listen to the next fellow's story. As he tells it, the boy *doesn't* want to play the fiddle. But his folks are crazy for him to become a concert fiddler. Get the idea?

No one tells exactly the same story about any of the pictures. Each testee "projects" his way of looking at things at those cards. Without realizing it, he reveals his hopes, disappointments, the way he reacts to trouble and opportunity. By the time he's through, he's told his life story.

Okay! I realize that you're probably boiling. How do I know? Almost everyone hates the idea of being tested when he first hears about it. But there are a few more things about the tests that you should know.

First and most important is the fact that very few employers decide on whom to hire and whom to promote *solely* on the basis of the tests.

Second, the testers are not out to wreck

[*Continued on page* 174]

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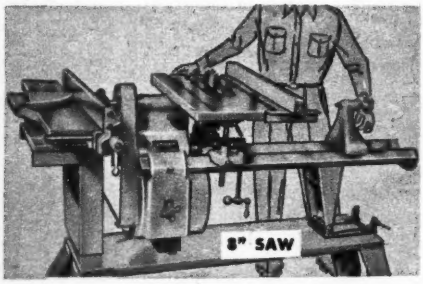

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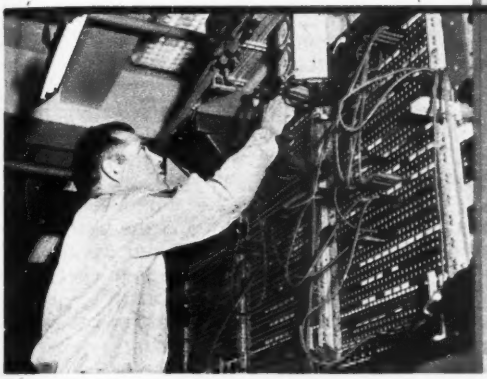
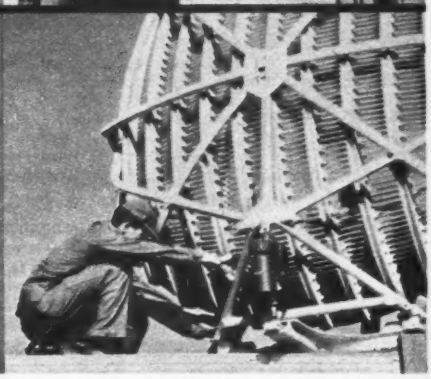
Send Details of FREE Home Trial Plan

FORMER SERVICEMEN

IF YOU HAVE A TECHNICAL SPECIALTY





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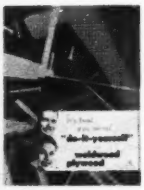
3 helpful booklets for home improvers

specially priced at only 25¢

Regularly worth 85¢, these three booklets are packed with "here's how" instructions on how to add new value to your home and its furnishings.

PROJECTS YOU CAN BUILD WITH WELDWOOD *OLD CRAFTSMAN* PINE PLYWOOD. With this 96-page book and *Old Craftsman* you can make toys, furniture, home improvements, kitchen cabinets. 18 projects in all, with complete instructions, materials lists, detailed drawings. Special section tells you how to plane, nail, drill, saw, screw, sand, glue, bend, and finish *Old Craftsman* Pine Plywood for best results. Regular price, 50¢.

FAMILY ROOMS IN BEAUTIFUL WELDWOOD—100 interesting ideas for the room your family lives in. Brand-new 20-page booklet with full-color photographs shows how you can build fun-giving, space-giving luxury into your family-room with handsome Weldwood Paneling. All the essentials of a satisfactory family room are treated in this booklet. Regular price, 10¢.



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Adhesives • Firzite® • Plywood • Satinlac® • Flexible Wood-Trim®

SPECIAL OFFER COUPON!

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Please send me your combination offer of three idea and plans books, described above, worth 85¢, at special price. Enclosed find 25¢. MI-3-58

Name.....

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City.....**Zone**.....**State**.....

All About Job Tests

[*Continued from page* 172]

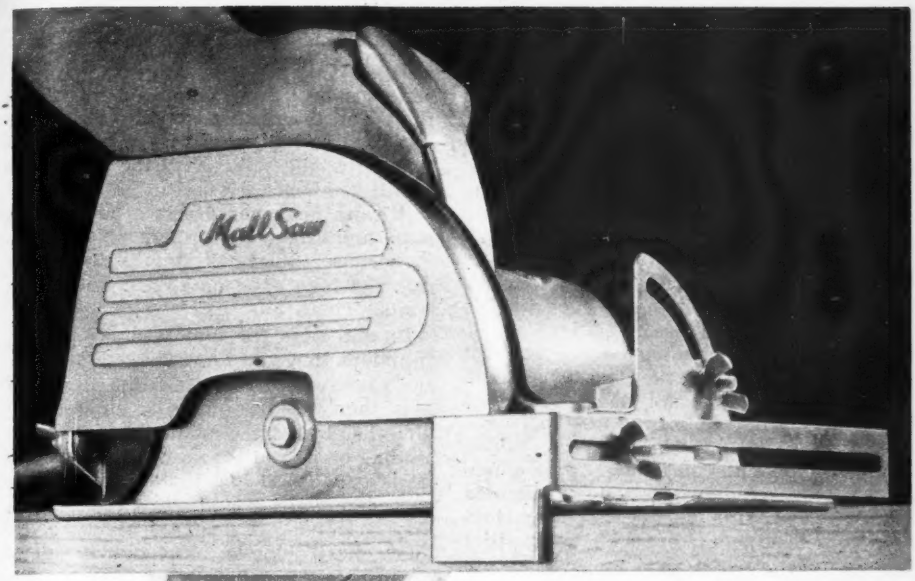
you. Many testers, when a company first announced a testing policy, were greeted by the employees as if they were Indians attacking a frontier outpost. But most people found that the world didn't stop the day they were tested. And many a guy who was overlooked before was amazed to find himself suddenly getting a lot of attention.

There are some people who have never reconciled themselves to the test, however. Their champion is a man named William H. Whyte, Jr., author of the best-selling book The Organization Man. Whyte attacks the personality tests as invading the privacy of the individual—besides being a poor gauge of ability. (Whyte gave standard personality tests to a group of top corporation men and fewer than half of them came out with satisfactory personalities!)

The personality test corrodes your self-respect, says Whyte, and the best thing to do when faced with this outrageous probing into your private life is to cheat. Most people do cheat, consciously or not, according to Whyte, and you're better off if you know what you're doing.

Now you obviously can't cheat in the way you might cheat on a math or history test—but you can improve your test score by assuming the personality you believe is desired by the outfit testing you. For instance, if an engineering firm asks you if you think Newton more important than Shakespeare, the chances are pretty good they want you to say Yes. A publishing firm would probably want the opposite answer. Whatever your real opinions, says Whyte, give the organization the answers they want. This might sound unfair to the testing company but Whyte believes your first duty is to yourself and your own career.

The advice of testing experts—as you might guess—is somewhat different from Whyte's. They say that when your time comes for a personality test, the best advice is—*Relax!* Many a bright guy who freezes with fear does worse than his calmer, dumber co-workers. Get in the frame of mind that this test is designed to find you the job you can do best. Just show yourself as you are. It'll probably turn out you've got the kind of personality and talents the employer is looking for! •



POWER

Remington 7-inch circular saw gives you an extra deep cut with power to spare! $59.95*

Ideal for home workshop or maintenance. Model 71 has depth capacity of full 2⅜" at 90°; will cut through 2" lumber at 45°; speed: 5000 rpm. Powerful 25-60 cycle motor rated at 8.4 amps. Telescoping blade guard; one nut adjusting depth and bevel shoe; ball and self-lubricating bearings; weight: 8¾ lbs. 10-ft. cord, plug and ground; blade and wrench included. Ask your dealer to show you this powerful saw—it's your biggest saw value!

TWO MORE POWERFUL REMINGTON TOOLS

Sturdy ¼" drill.
Model 149B, complete, $28.50*

Rugged belt sander.
Model 31, complete, $89.95*

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Please send me FREE ILLUSTRATED CATALOG MI-3

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Woodchucks

[*Continued from page* 73]

less. You should not smoke, scratch a mosquito bite or brush a fly from your face.

Each chuck palace has from two to five or more back doors—well-concealed ones—scattered about in the food supply. These are escape holes and they never show any dirt around them or high grass. But they are there and you can bet your new rifle on it. You can also bet that Mr. Chuck will never be more than one good tumble from one of these holes.

Let's say you have spotted several fat chucks, walked in, marked the spots where they disappeared, and then concealed yourself. What do you do now?

You wait, of course, as motionless as humanly possible, with your eyes glued to the nearest hole where a chuck tumbled in. Also, by rolling your eyes (not by moving your head) you keep a check on other likely holes. When Mr. Chuck decides to come out and see if you have gone to greener fields, he comes as cautiously as a well-trained marine approaching an enemy machine gun nest. He just seems to slide his head up. One moment it isn't there and the next it is. All you can see is a flat line that wasn't there before, cutting across the hole. Next the head comes up till you can see it all.

A rank beginner draws a bead at this point and fires. If he hits he never knows it, because the chuck simply drops back into the hole dead or alive. The expert waits.

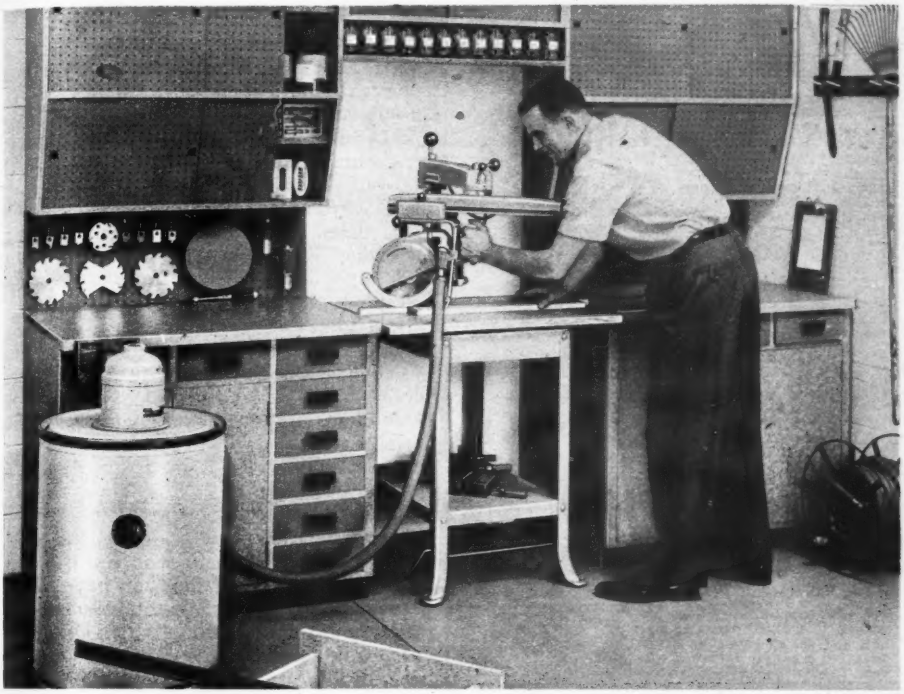
In due time the chuck comes on out, confident that you have gone to pick daisies some place else. He looks all around him, then waddles off, belly almost dragging the ground, to resume the interrupted feeding or nap in the sun. As he travels, he is usually so low that the grass conceals him. If he feeds, this concealment may continue. In this case, simply give a loud, sharp whistle. The chuck will sit up instantly and look all around for you, giving you a target.

For chuck hunting, as for deer, I like

[*Continued on page* 178]

ROCKWELL-BUILT

DELTA "900" RADIAL SAW



most powerful radial saw built for home workshops

Rugged as it is good looking, the New Advanced Design "900" Radial Saw is powered by a *full* ¾ hp motor. And it's so versatile that actually it's a complete, *all-purpose* workshop! You can rip, cross-cut, drill, sand, shape and do many other jobs fast and accurately. Also shown above is the New Advanced Design Delta Dust Collector. Use it with *any* power tool to keep your shop free of sawdust—even to spray paint. It's powerful enough to pick up a 1" steel ball.

IT'S SO EASY TO OWN THE BEST!

Because Delta makes the world's most *complete* line of combination, all-purpose and individual power tools, you can choose tools exactly right for *you*. And you'll have the "newest look" in the world's finest power tools.

BUILD THIS ALL-PURPOSE SHOP

Delta experts designed the compact workshop shown above so that you can build it in your garage or basement. Easy-to-follow plans and the New Delta Reference Guide are yours—for just 10¢—send your remittance with your name and address to Rockwell Manufacturing Co., Delta Power Tool Division, 556 C N. Lexington Ave., Pittsburgh 8, Pa.

Do it now — then see all the New Advanced Design Delta Tools at your Delta Dealer. (He's listed under "TOOLS" in the Yellow Pages.) Or at leading Department, Hardware, and Building Supply Stores.

DELTA POWER TOOLS

another fine product by

ROCKWELL

"Build Your Own"
gas drive portable
ARC WELDER

SAVE $200 to $300

1

A surprisingly low investment puts you in the profitable welding trade. Couple a top performing Hobart generator with a good used auto engine and you're in business with a portable arc welder that lets you weld anywhere, any time.

Earn MORE!

Hundreds of opportunities exist in the welding field. Lets you go after the profitable outside jobs. Get started today and cash in!

"Husky Boy" air-cooled arc welder

2

Welds anywhere. Easily mounts on truck or trailer for getting to those profitable emergency repair jobs. Light, rugged, compact and air-cooled. Fine for fabrication purposes and tough enough for continuous operation on light or medium production work.

AC welder—AC power

3

200 amp. combination that you can connect to your own power source. Lets you operate where no power lines are available. Furnishes current for welding and power for running tools, lights, motors, etc. Build your own combination welder and power unit with a good used auto engine.

utility AC shop type welder

4

Superior performance, economical operation and general serviceability make this a popular model for small shops, implement shops, auto service shops, plumbing and heating contractors, farm welding, etc. Has same features as the big industrial models.

Welding Lessons 200 pages fully illustrated Self-teaching $1.00

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City_____ State_____

Woodchucks

[*Continued from page* 176]

a rifle sighted in for 200 yards. And, since I go chuck shooting as much to keep in practice for deer and other large game as I do for the thrills of hunting chucks, I use the same rifle that I do for big game. Only the loads for chuck are different. My cartridges are all handloaded in my workroom especially for chucks. The rifle is a 30-06—for my money the most versatile gun made today, excellent for any game from chucks to bear, elk and moose. While I handload to suit myself, you can buy 30-06 cartridges factory-loaded, suitable for chucks. Specifications are as follows: cartridge, 30-06 Springfield; bullet weight and type, 110-gr. s.p.; muzzle velocity, 3,420 f.p.s.; trajectory at 100 yds. 0.4; at 200 yds. 2.1; at 300 yds. 5.6.

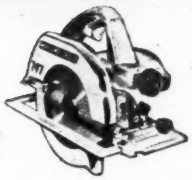
Next in importance to rifle and ammo is a scope. Dont' try to skimp here if you're planning on a new outfit. A good scope costs almost as much as a good rifle but is worth every cent. Don't go bargain hunting or you'll regret it in the field—when it's too late.

To find good shooting, drive slowly through fertile farm country and stop every now and then to scan the hillsides with a good glass. When you have found plenty of chuck signs, drive to the farm or ranch house and (leaving your rifle in the car) walk slowly to the door and ring the bell. Politely ask for permission to hunt chucks, offering to show your hunting license and your driver's license. Then ask where you may hunt, the location of grazing cattle and if any men will be working in the fields. Also ask if the owner wishes you to bring him the chucks. Many farmers eat young chucks. Their meat is delicious when prepared properly. In any event, don't leave dead chucks lying in the fields. They attract crows, foxes and other undesirable animals. Don't leave pasture gates open or take down wooden fences or cut or climb over wire fences. Respect the property of the man who lets you hunt and he may invite you to return in rabbit or bird season.

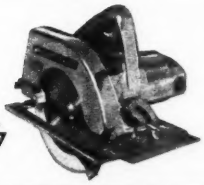
Happy hunting. •

When answering advertisements please mention MECHANIX ILLUSTRATED

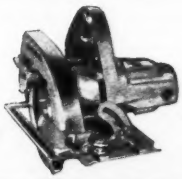
Here's the most advanced saw line on the market today!



No. 747
7¼"



No. 727
7"



No. 626
6½"

Millers Falls ALL-NEW line of
FULL-POWER SAWS

Four all-new, deep-cut models, loaded with exclusive features and Millers Falls traditional high quality. You'll find here a saw for every job — and every budget; with more power per pound than any others on the market. Two heavy-duty models feature quick-change integral depth and angle adjustments, safety window, exclusive Micro-Guide, and full 2 h.p. motors. Two new standard-duty saws have 65% power boost over previous models, with professional features and performance that make light work of 90% of all sawing jobs. All are rugged, lightweight, perfectly balanced — and at prices unmatched for this quality. See them at your dealers today!

HEAVY DUTY

No. 800 - 8¼" . . . . only $95.00
No. 747 - 7¼" . . . . only $84.50

STANDARD DUTY

No. 727 - 7" . . . . . only $74.50
No. 626 - 6½" . . . . only $54.50

MILLERS FALLS CO. • Dept. MI-2 • Greenfield, Mass.

FINEST HAND AND POWER TOOLS MADE FOR HOME AND INDUSTRY

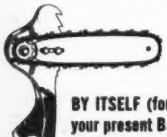
Now! A lightweight chain saw for heavyweight cutting!

New Black & Decker Chain Saw Attachment plus Black & Decker Saw brings you cleaner, faster, easier chain sawing!

Talk about versatility! With this new Black & Decker Chain Saw Attachment, you can buck, fell, limb, trim, notch quickly and easily! Quick, because this attachment is powered by the famous Black & Decker Saw motor. Easy, because it's so light.

And it's even more versatile because you can convert right back to a full-powered circular saw for dozens of other sawing jobs! Even if you only do occasional chain sawing, it will pay you to get this money-saving combination of a B&D Saw and Chain Saw Attachment. See your dealer now! **The Black & Decker Mfg. Co.**, Dept. R-038, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ont.)

YOU CAN PURCHASE THE B&D CHAIN SAW ATTACHMENT:



BY ITSELF (for your present B&D #73 or #83 Saw)

Cast aluminum; teeth grip wood while cutting. Handles trees up to 18" diameter.

IN COMBINATION (with #73 Saw)

2 saws in 1, at attractive saving! Converts from saw to chain saw in minutes. Weighs 14⅝ lbs!

Black & Decker®

World's Largest Maker of Electric Tools

Look under "Tools-Electric"

Who Thought Of It First?

[*Continued from page* 96]

ANSWERS

1. TRUE. Benjamin Franklin made the first bifocal eyeglasses in 1780.

2. FALSE. The first cannon-carrying tank was built by Charles E. Dickinson of the U. S. in 1862. It was a steam-driven tractor on which a cannon was mounted with bullet-proof shielding for the cannoneers.

3. FALSE. The first non-stop trans-Atlantic flight was made by Britons John Alcock and A. W. Brown in 1919 from Newfoundland to Ireland.

4. TRUE. The first vehicle propelled by its own engine was built in 1769 by Frenchman Nicholas Cugnot. It was a 3-wheeler with a steam engine providing the motive power.

5. FALSE. The first man to send a message by telegraph was Swiss inventor Georg Louis Le Sage in 1774. His complex system needed a separate wire for each letter of the alphabet—but it worked.

6. TRUE. The first powered *model* airplane to fly was exhibited by the British inventor Stringfellow in London in 1848. It was powered by a steam engine.

7. TRUE. Lippershay was a Dutch spectacles-maker. He mounted two lenses in a tube to look at distant objects in 1608, a year before Galileo built his telescope.

8. FALSE. The first man to see the Antarctic continent was the Russian F. G. von Bellingshausen in his voyage of 1819-1821. Cook circumnavigated Antarctica but never saw land.

9. FALSE. The first sewing machine was invented by a Frenchman named Thimmonier in 1830.

10. TRUE. The first cannon was invented by German monk Berthold Schwartz in 1318. The Chinese invented gunpowder many years before but used it only in fireworks.

11. TRUE. The first parachute jump was made from a tower by a Frenchman named Lenormand in 1783. The first jump from a balloon was made by another Frenchman, A. J. Garnerin, at Paris in 1797.

12. TRUE. The first known use of opium was by the Greeks in 800 B.C. It was not introduced into China until the 13th Century A.D.

13. FALSE. The first *battle* between armored warships took place in 1598 between the Japanese and the Koreans. A Korean admiral used an armored raider to cut Japanese sea communications in 1591.

14. TRUE. The first successful steamboat was the Charlotte Dundas built by a Scot named Symington. It sailed on the Forth & Clyde Canal in 1802.

15. FALSE. The first picture scanner for television was developed in 1884. In that year Russian P. Nipkow proposed a scanning disk to analyze a picture for electrical transmission.

16. FALSE. The first man to develop the atomic theory was the Greek philosopher Empedocles who, in the 5th Century B.C., suggested that all matter is composed of invisible particles.

17. TRUE. The Zero was first used in India. In Sanskrit the word for Zero is *sunya*. This became *ssifr* in Arabic and cipher in English.

18. FALSE. Aspirin, as we know it today, was discovered by a German named Dresser in 1819. However, salicylic acid salts, the active ingredient in aspirin, was used by primitive medicine men who obtained the drug from infusions of willow bark and other vegetable sources.

19. TRUE. The Rising Sun (British) made the voyage from Liverpool to South America in 1818. The more famous Savannah wasn't a true steamer but a sailing vessel with steam auxiliary. She made her first transatlantic voyage in 1819.

20. FALSE. The first use of rockets as weapons was during the Japanese wars of the 16th Century.

HOW TO SCORE YOURSELF

We'll admit this is a tough quiz so we'll go easy on you. Take 5 points for each correct answer. If you total 50-70 points, consider yourself Average. If you scored 70-85, you deserve a round of applause as a keen student of history. And 85-100 earns you the awed congratulations of the Editors—and when are you going on a quiz show?

When answering advertisements please mention
MECHANIX ILLUSTRATED

Just in time for Fix-up Time!

25% MORE POWER
at a
NEW LOW PRICE!

Famous
Black & Decker
U-3 DRILL
Only $24.95

The Black & Decker U-3 1/4" Deluxe Utility Drill has always been famous for power. Now its B&D-built motor gives you 25% more power . . . to handle all kinds of rough drilling jobs in steel, wood, masonry or any other material. Still the same ease of handling . . . to let you work for long stretches without tiring. Still the same toughness . . . to give you many years of honest service. And all at a new low price! Ask your electric tool dealer about the B&D U-3 1/4" Deluxe Utility Drill. Or write: THE BLACK & DECKER MFG. CO., Dept. R038, Towson 4, Md. (In Canada: P.O. Box 278, Brockville, Ont.)

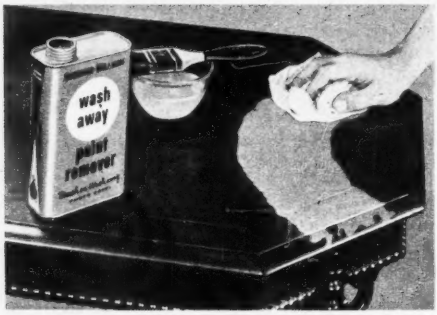
USE THE NEW U-3 POWER FOR ANY OF 24 B&D ATTACHMENTS

Running an attachment puts added strain on a motor. The motor of the new B&D U-3 Drill is powered to carry this extra sustained load because it is built by B&D with power to spare. Get more from your attachments with the U-3. And remember—with B&D Attachments engineered to work as a team with B&D Drills, you have 24 tools:

Saw	Floor Polisher	Masonry Drill	Orbital Sander
Jig Saw	Hedge Trimmer	Drill Press	Furniture Polisher
Wood Auger	Screw Driver	Countersink	Disc Sanding Table
Hole Saw	Car Polisher	Metal Buffer	Abrasive Shapers
Grinder	Paint Mixer	Bench Drill	Wire Cup Brush
Roto-Hone	Twist Drill	Disc Sander	Wire Wheel Brush

Look under "Tools-Electric"

Black & Decker®
World's Largest Maker of Electric Tools



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Amazing how easy it is to use this miracle new WASH-AWAY Paint Remover. Just brush it on . . . wait a few minutes . . . wash off with water — your surface is clean, ready to refinish. Ideal for removing old finish from delicate antiques. Fine for outside use . . . siding, shutters, porches, boats. No scraping! Nonflammable!

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THE TRIUMPH CORPORATION, Towson, Baltimore 4, Maryland

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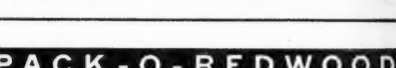

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Lab In Outer Space

[*Continued from page* 64]

attractively decorated and has its own closets and bath. Outside doors open on a promenade that circles the satellite's rim. Through its plastic enclosure, superb views of the solar system unfold with the sunlit earth hanging like a huge globular relief-map at eye level.

Descending to the lower deck, we find long rows of research labs and technical workrooms, each dedicated to some scientific specialty. We don dark glasses and are permitted a glimpse of the hydroponic gardens that circle the satellite's sunny side. Grown in a nutrient solution circulated through large plastic tubes, selected algae absorb the carbon dioxide from the crew's breathing air and replace it with fresh oxygen. Functioning like the old familiar balanced aquarium, the "farm" thus maintains a self-perpetuating atmosphere and at the same time produces a high-protein food for emergency use. For protection against the impact of "space dust" and oceasional small meteoric fragments, the gardens are installed in sections, divided by airtight bulkheads and doors. Each can be repaired without affecting the rest.

We have now completed our guided tour of the satellite and, being notified that the rocket ship is ready to depart, we take leave of our hosts and board the ferry. The trip back is easier than our outward journey. The rocket drops earthward at an easy pace, slowing down to avoid too high a re-entry temperature. Soon we approach our base and, tail down with rockets firing to brake our descent, we settle onto the landing pad. We have had a view of a pioneer space laboratory and with it the opportunity to participate in a small way in the third step of man's conquest of the universe. •

World's Toughest Birds

[*Continued from page* 79]

captivity are simply overfed. "Swans can't handle the chicken mash and grain many owners feed them," Cunningham says. "The swan naturally lives on tender water plants. I feed them baskets of grass clip-

[*Continued on page* 185]

FREE PLAN

Tells How to Start Your Own Business

FILING SAWS

Sharpens 1000 Saws a Year

"I sharpen around 1000 saws a year in my part-time shop. Work comes from as far as 55 miles away."—Joe H. Walker.

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"I have filed about 500 saws in spare time. My wife agrees the Foley Filer is a good investment because it earns enough extra cash to buy our groceries."—R. J. Kreuser

FOLEY FILED SAWS BRING NEW CUSTOMERS

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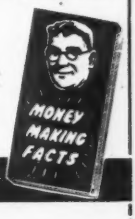
You can file all hands saws, also band and crosscut circular saws on the Foley Saw Filer. The adjustments are simple—there is no eyestrain—and you can start right away to turn out perfect cutting saws. "The first saw I sharpened with my Foley Saw Filer came out 100%. I think it is a marvel of perfection."—writes Clarence E. Parsons.

"MONEY MAKING FACTS" explains how you can get business from hardware stores, home owners, farmers, carpenters, schools, mills, factories, etc. Just think, with a modest investment, no overhead, no stock of goods to carry, you can start right in on a cash business that will help pay the rent, buy groceries, or a new car. Get the facts; send coupon today for this practical, money making plan. No salesman will call.



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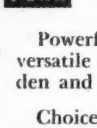

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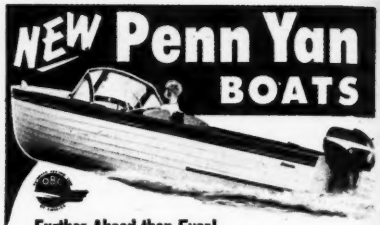

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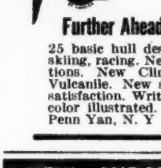

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World's Toughest Birds

[*Continued from page* 183]

pings and a little grain. Too much fattening food kills them."

The usual diet for Cunningham's 40-50 swans is about 20-24 grass catchers full of lawn clippings three times a week. Fortunately, around the Seattle area grass grows for all but about three months of the year.

One of the reasons swans live so long is that they have practically no diseases of their own. They do catch waterfowl diseases from ducks and geese when kept near them for long periods.

Although hundreds of visitors flock out on weekends to see Cunningham's swans swimming majestically on his ponds, he sells very few to casual visitors. But every fall Cunningham sends a descriptive price list of his stock to every large zoo in the country. When individuals who want swans for their lakes or ponds write to the nearest zoo for information, the zoo director hauls out Cunningham's price list.

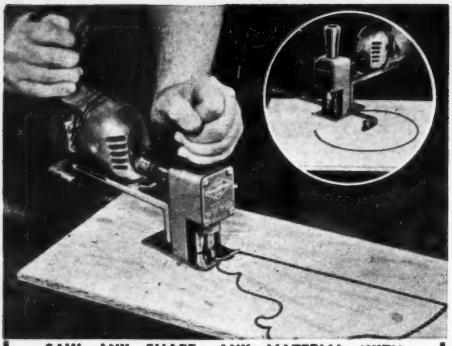
Most of Cunningham's sales are to individuals. An industrialist wants to decorate a small lake around his suburban factory, or a country estate owner may want a regal addition to his pond.

Collectors buy most of Cunningham's rare swans. The small black-neck swans are the rarest of all—so rare that even Cunningham has none for sale at the moment. He estimates there are only about 24 of them in all of the United States. "And I have three females," he says proudly. "So far I haven't been able to buy a male. Anyone with a male wants to buy one of my females. What I'm looking for is someone with two male black-neck swans. Then I'll trade one of my females for one of his males." But Cunningham isn't impatient. He knows that his three female black-neck swans will probably outlive him.

Swans are shipped in wooden boxes with wire screening too small for them to put their heads through. Cunningham ships the swans by rail or air express, depending on the distance. The feed and water he puts in their shipping containers is mostly to satisfy the express agents, as the swans neither eat nor drink during the trip.

Of the five species Cunningham raises

[*Continued on page* 187]



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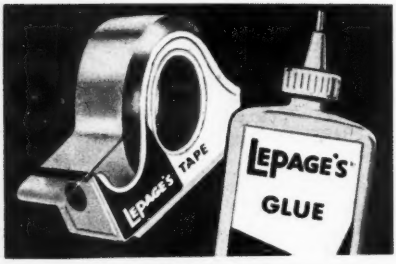

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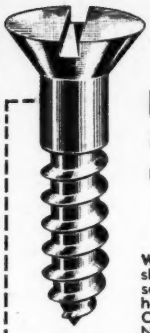

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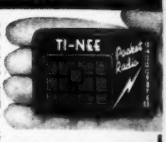

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World's Toughest Birds

[*Continued from page* 185]

the most common is the familiar Mute, the long-necked white swan with a yellow bill. They are the largest, the biggest eaters and they fetch the lowest price—an irony not lost on Cunningham. A pair of Mutes costs from $85 to $125.

The Whoopers are smaller with black bills except between eyes and nostrils. They sound rather like melodius baritone bullfrogs and they come from the wilder parts of northern Europe. They fetch $200 a pair, more or less. The Black Australian swan, in nearly every case descended from birds imported before 1929, has sooty black plumage, scarlet eyes and a bright red bill with a knob near the base. Rarest of all is the little black-neck swan from South America, which fetches $500 a pair when available. Black-necks and black Australians have shorter necks than the Hans Anderson type of swan, but are charming and beautiful birds all the same. Black-necks are hard to breed and hard to import; hardly any survive the trip to the U. S. with 15-day quarantine at Miami, which accounts for their price. Whistler swans are protected in the U. S., but a few pairs are in captivity. Cunningham has a pair on loan from Woodland Park Zoo in Seattle.

The two species of swan Cunningham does not raise are the little European Bewick and the North American Trumpeter. The latter lives in the northern U. S. and southern Canada and is protected by the Fish and Wildlife Service, which counted 588 during the last census.

What about the fabulous swan song—the song the swan is supposed to sing just once, at the hour of its death? Cunningham says there may be something to it; northern swans like the Whoopers and Whistlers have looped windpipes, and dying swans of this type have been heard to produce a prolonged musical sigh. Oddly enough the swan song myth seems to have come from ancient Greece where there are no swans of this type. Probably the old story is a poet's dream, based on little more than the fact that swans do not sing. •

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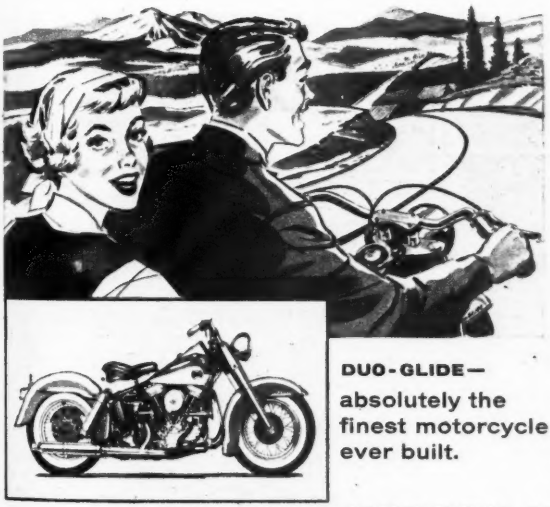

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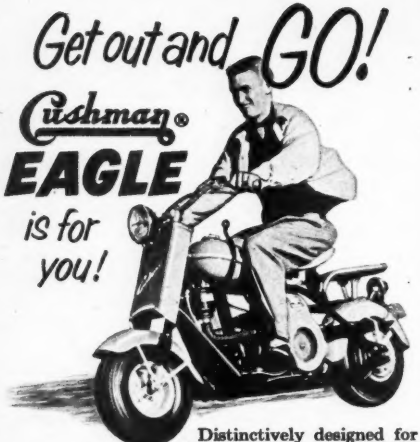

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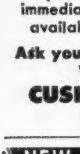

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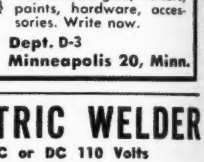

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The Screw Driver

[*Continued from page* 161]

low) handle connects to several sizes and types of interchangeable bits which are stored in the handle. The shaft has a chuck to receive standard and Phillips bits, and an adapter is used to hold socket-type drivers.

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Square Shank Drivers: Wrench or pliers may be used on this blade to get additional leverage.

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Screw driver tips that have become rounded or chipped may be restored by dressing. This can usually be done by filing, though sometimes grinding is required. Grinding should be done in slow stages to avoid overheating which will draw the temper and soften the metal.

—*Ralph Treves*

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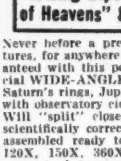

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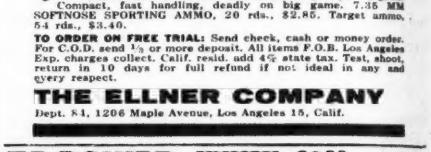

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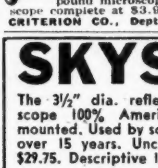

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A Ten-Dollar Telescope

[*Continued from page* 164]

to aim the mirror so that the reflected light strikes the diagonal, B, in the drawing. Your mounting really consists of a simple rig which will hold in correct optical alignment, the mirror, the diagonal and the eyepiece. Make the cell as indicated in the drawing on page 158. Mount the cell at the end of the long board. Make certain that the two braces connecting the cell support to the board are stiff enough so that there is no play.

Next make the eyepiece out of a spool as shown in detail A. The hole for the eyepiece should be drilled at a distance from the face of the mirror which is equal to the focal length of the mirror less four inches. This four inches is taken up by the distance between the diagonal and the eyepiece. If you don't hit the exact spot, don't let it bother you too much. You can always make adjustments by moving the mirror cell support up and down a half-inch at a time. For this reason it is a good idea to allow plenty of room behind the cell support instead of mounting it at the extreme edge of the mounting.

By designing the mounting along the lines of an "equatorial" you can follow any star or the moon by means of a single motion instead of two zig-zag motions. Build a concrete pier in the ground, deep enough to extend beyond the frost line. In it, before the concrete has set, place a 2x24-inch pipe.

Next, get a length of one-inch OD pipe and bend it as shown in the photograph. The bend should be equal to the latitude of your home. For example, in the New York area it is approximately 42°. Insert the bent pipe into the larger pipe. Do this at night. Insert the bent pipe so that it points due north, not magnetic north. The best way to determine due north is to aim the pipe at Polaris, the pole star. Then fill the opening up with concrete and go to bed. Give it a chance to set before installing the mounting.

Eyepiece And Diagonal

While you are anxiously waiting for the concrete to set you can proceed with the construction of the eyepiece and the diagonal mirror bracket. Their construction is fairly simple and obvious. Make them as shown in the drawing and the photographs. At about this point you will probably be very anxious to literally see what all this business is about. So, install the unsilvered mirror in its cell, stretch two black strings at right angles to each other across the mirror, insert the diagonal mirror in its brackets and then the eyepiece.

You probably won't see anything at all and it is at this stage where you will probably need some bit of assistance. Label each of the three wing nuts at the bottom of the mirror cell, 1, 2, 3. Seat an assistant at the rear end of the telescope and tell him to tighten or loosen wing nuts No. 1, 2 or 3 as you direct. Remove the eyepiece and look through the eyepiece hole. Have your assistant tighten and loosen the wing nuts until you see the large mirror in the small mirror. Keep adjusting the wing nuts until the reflected image is in the exact center of the diagonal mirror. The diagonal in turn should be in the exact center of the eyepiece hole.

At this stage it is a good idea to relax and wait for the moon. The unsilvered mirror will give you a beautiful view of the moon, our nearest celestial neighbor, which has an abundance of light and does not require a silvered or aluminized speculum. In order to help aim your telescope, insert a screw eye near the mirror and a brad at the eyepiece end. Aim the telescope as you would a gun.

Insert the completed spool eyepiece into the eyepiece hole and get the moon, by means of the sights, into the approximate field of view. At first you will be a little disappointed for all you will see is a giant glob of light and you are probably thinking —heck this doesn't work at all. But be patient!

Move the eyepiece in and out by means of a screwing movement until at a certain point you will find the glob of light getting into focus. With bated breath you will find yourself adjusting the eyepiece until this glob of light finally resolves itself under your trembling fingers into the rill and valleys, mountains and craters of our nearest heavenly neighbor. A never-to-be-forgotten thrill!

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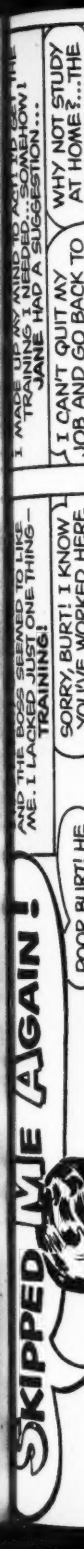

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I MADE UP MY MIND TO ACHIEVE THE TRAINING I NEEDED... SOMEHOW! JANE HAD A SUGGESTION...
I CAN'T QUIT MY JOB AND GO BACK TO SCHOOL! AND I SURE DON'T WANT THAT NIGHT CLASS ROUTINE IN THE CITY!
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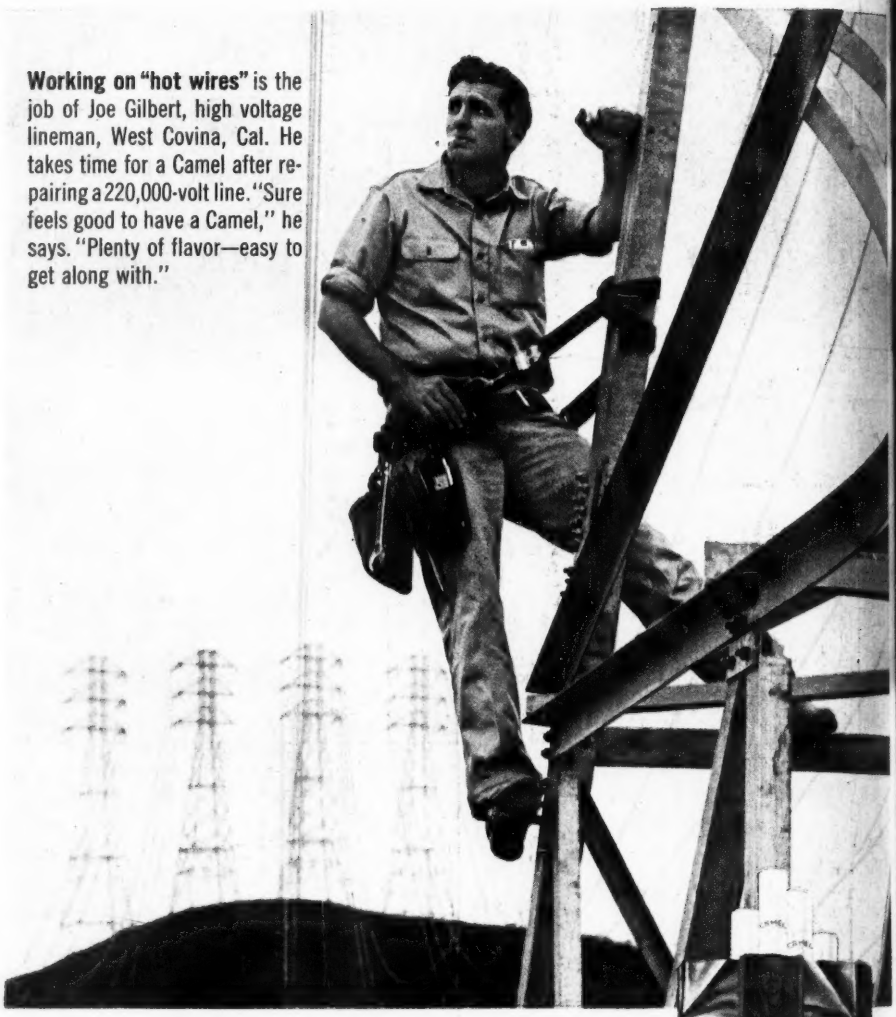

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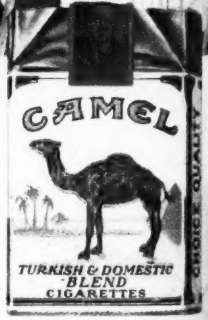

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